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EPA

Environmental Impact Statement

Draft

COMPLETED

Fayette Power Project

ORIGINAL

Fayette County, Texas

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Draft
Environmental Impact Statement
for
Fayette Power Project
Fayette County, Texas

Environmental Protection Agency
Region 6
Dallas, Texas
January 1979

Approved By

Adlene Harrison
Regional Administrator

a

EXECUTIVE SUMMARY
ENVIRONMENTAL IMPACT STATEMENT

New Source NPDES Permit for the
Fayette Power Project
Lower Colorado River Authority

(X) Draft Environmental Impact Statement
( ) Final Environmental Impact Statement

U. S. Environmental Protection Agency
Region 6
Dallas, Texas

1. Name of Action: (X) Administrative ( ) Legislative

2. Summary Description of Administrative Action

The United States Environmental Protection Agency (USEPA) is considering the issuance of a New Source National Pollutant Discharge Elimination System (NPDES) permit for wastewater discharge from the Fayette Power Project into Cedar Creek and the Colorado River. The applicant, the Lower Colorado River Authority (LCRA), has initiated construction on a coal-fired steam electric station on a site located seven miles east of La Grange in Fayette County, Texas. Pursuant to the National Environmental Policy Act of 1969 (Public Law 91-190 or NEPA), USEPA has prepared this Draft Environmental Impact Statement (DEIS) to evaluate the potential impacts of the proposed action on the human environment.

NEPA requires that all Federal agencies prepare detailed environmental impact statements on major actions significantly affecting the quality of the human environment. Furthermore, Section 511(c)(1) of the Federal Water Pollution Control Act (FWPCA) as amended (P.L. 92-500 as amended by P.L. 95-217) mandates that the requirements of NEPA apply to the issuance of a permit under Section 402 of FWPCA for the discharge of any pollutant by a New Source as defined in Section 306 of FWPCA. USEPA has determined that the issuance of a New Source NPDES permit to the applicant would represent a major Federal action significantly affecting the quality of the human

environment. Based on this finding, a detailed environmental impact statement on the proposed action has been prepared.

As directed by Section 102(2)(c) of NEPA, this statement describes: (1) the environmental impact of the proposed action; (2) any adverse environmental effects which cannot be avoided should the proposal be implemented; (3) alternatives to the proposed action; (4) the relationship between local short-term use of man's environment and the maintenance and enhancement of long-term productivity; and (5) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.

3. Summary Description of Proposed Action and Associated Impacts

The Lower Colorado River Authority and the City of Austin are constructing the Fayette Power Project in response to the increasing demand for electric power. This need is based on projected loads for the service area and the needed reserve margins of the individual utilities and on the lack of other available sources of power. Based on this projected need, LCRA has initiated construction on the project at their own risk prior to EPA's issuance of the NPDES permit. This will allow Unit 1 to be operational by June 1979 and Unit 2 to be operational by June 1980. Currently, Unit 1 is approximately 75% completed while Unit 2 is 11% completed. The project consists of two 600 MWe fossil-fueled steam electric generating units along with associated coal handling and storage areas, ash storage area, switchyard, cooling pond, flue gas stacks, maintenance and administrative buildings, and 121 miles of new or widened transmission corridor. The water needs for the power plant will be met through the use of both surface water from the Colorado River and the 2,400 acre Cedar Creek cooling pond. The cooling pond will require a maximum monthly average of 50 cfs from the Colorado River, representing 17.0% of the 7-day low flow.

During the construction phase of development, surface water impacts have resulted from sediments produced during clearing, excavation, and fill operations. This runoff from the construction area has been controlled and treated prior to discharge, thereby resulting in minimal impacts. Other

sediment producing activities have been localized and of short duration. The primary construction impact on water resources has been the impoundment of Cedar Creek which has changed the upstream portion of the Creek from a running to a standing water system with the associated changes on the aquatic environment. Some pre-project species will not reproduce in the cooling pond. However, it is expected that new and other existing species will reproduce and that the reservoir will have significant recreational value.

The formation of the cooling pond has changed that portion of Cedar Creek from a groundwater discharge to a recharge area. Although power plant operations will result in increased temperature and dissolved solids levels in the cooling pond, Cedar Creek, and the Colorado River, these increases should not significantly alter the water quality of these water bodies or the groundwater resources.

No major impacts have or are expected to occur on the geologic conditions of the project area. Some minor changes in natural drainage patterns and topography have occurred which are irreversible, but the formation of the cooling pond has provided a locally unique water resource which provides aesthetic relief in comparison to the typical land forms of the area.

The project area has experienced some localized, intermittent fugitive dust emissions during the construction phase of this project, but the primary impacts to the air quality of the region are expected from the operation of the facility. Increases in the ambient levels of sulfur dioxide, particulate matter, carbon monoxide, hydrocarbons, oxidants, and nitrogen oxides will occur during plant operation, but will be well below the ambient standards established for the protection of health and welfare. The cooling pond also will tend to lengthen the occurrences of fog in the project area, but is not expected to result in increased ice formation.

The sound quality of the project area was minimally increased during project construction, but this increase had no significant impacts on the nearest residences or the point of closest public approach (cooling pond intake). During operation, the plant is anticipated to raise ambient noise

levels by 0-8 dB. However, these increases should not significantly impact nearby residences.

Although prior to construction 97% of the site supported some type of vegetation, most of which has been eliminated along with the animal species it supported, no rare or endangered species were affected by site development. Although terrestrial biological productivity has been reduced, aquatic biological productivity has been increased through the formation of a nutrient-rich cooling pond. Construction activities in transmission line corridors also have destroyed some vegetation, but planned revegetation measures for the corridors will ultimately increase habitat diversity in the project area.

Three historic structures were removed intact from the project site prior to construction. The Biegel-December House was moved to the Winedale Inn Historical Complex, the Legler Log House was disassembled and put in storage at the Winedale Inn Historical Complex, and the Gentner-Kroll-Polasek Farmstead was sold to private individuals and removed from the project site. The architectural details of those structures moved to the Winedale Inn Historical Complex were recorded and complete sets of measured drawings and photographs were prepared. The archaeologic investigations were documented in two reports prepared by the Texas Archaeological Survey. Six of the archaeological sites were fully investigated and recorded. A total of twenty-five other archaeological and historic sites were also identified on the site. Since none met the criteria for nomination for National registration for historical places, the Texas Historic Preservation Officer made no nomination. Historic and archaeological information from the twenty-five sites was gathered and has been preserved although no artifacts were removed and presumably will be lost due to the construction activities.

The conversion of 3,000 acres of agricultural land to an industrial land use has resulted in a reduction in agricultural productivity. Most of this land was used as pastureland. Approximately 700 acres of prime farmland exist on the site, but only a small portion of it was cultivated. This prime farmland may be irretrievably lost since pre-project

soil conditions are unlikely to be duplicated.

Other impacts on the socioeconomic characteristics of the project area are expected to be minimal, but primarily beneficial. Employment, disposable incomes, and retail sales have and will continue to increase. Property and school tax losses will be offset by increased sales tax revenues resulting from the sale of electric power. Some minor adverse impacts on community facilities and services, particularly housing, schools, and traffic, have occurred during the construction phase. However, as the construction labor force decreases and is replaced by a smaller operating staff, these impacts will be reduced.

4. Alternatives Considered

Five alternatives that do not require the creation of new electric generating capacity were considered by the applicant. These are: (1) no action; (2) purchase or exchange of power: (3) reactivation or upgrading of existing units; (4) conversion of peaking units; and (5) voluntary consumer conservation. None of these non-structural alternatives was considered a viable alternative for meeting the demand for electricity. The alternatives that were considered by the applicant requiring the creation of new electric generating capacity included the use of six different power sources: (1) natural gas; (2) nuclear power; (3) oil; (4) geothermal energy; (5) solar energy; and (6) solid fossil fuels. The selection of solid fossil fuels considered Texas lignite and several alternative coal supplies. Other alternatives considered in the project planning were six alternative sites and six alternative cooling systems. The final selection of a coal-fired steam electric generating plant at the Cedar Creek site using a cooling pond was based on economic, environmental, timing, and sizing considerations which favored this alternative.

The alternatives available to USEPA are the issuance of the New Source NPDES permit for the facility as proposed and/or conditioned, or the denial of the permit. If the permit were denied by USEPA, LCRA could redesign the project's pollution control facilities to conform with the permit requirements. It is likely that LCRA would proceed with this course

of action since they have initiated construction at their own risk without USEPA's approval of the NPDES permit and have already committed substantial resources to this project.

5. Federal, State, and Local Agencies and Other Sources from Which Comments Have Been Requested

Copies of this Draft EIS were made available to the following:

Federal Offices

Department of Interior
Corps of Engineers
Advisory Council on Historic Preservation
Department of Commerce
Department of Agriculture
Soil Conservation Service
Federal Highway Administration
Department of Health, Education and Welfare
Department of Housing and Urban Development
Department of Energy
Water Resources Council
Federal Energy Regulatory Commission
Department of Transportation
Honorable John Tower, U. S. Senate
Honorable Lloyd Bentsen, U. S. Senate
Honorable J. J. Pickle, U. S. House of Representatives

State Offices

Texas Budget and Planning Office (A-95-Clearinghouse - distributes statements to all state agencies)
Texas Historical Commission
Governor's Office
Texas Parks and Wildlife Department

Other Interested Parties

City of La Grange
National Audubon Society
Sportsmen's Club of Texas
Natural Resources Defense Council
Texas Environmental Coalition
Nature Conservancy
Izaak Walton League of America
Environmental Defense Fund
National Wildlife Federation
Texas Organization for Endangered Species
League of Women Voters
American Lung Association of Central Texas
Sierra Club of Texas
Citizen's Environmental Coalition

TABLE OF CONTENTS

	Page
EXECUTIVE SUMMARY	i
TABLE OF CONTENTS	vii
LIST OF TABLES	x
LIST OF FIGURES	xii
1.0 INTRODUCTION	1
2.0 NEED FOR THE PROJECT	2
2.1 NATIONAL ENERGY TRENDS	2
2.2 STATE AND REGIONAL ELECTRIC UTILITY TRENDS	3
2.3 APPLICANT'S NEED FOR THE PROJECT	5
3.0 ALTERNATIVES	6
3.1 ALTERNATIVES CONSIDERED BY THE APPLICANT	6
3.1.1 No Action	6
3.1.2 Purchase or Exchange of Power	6
3.1.3 Reactivation or Upgrading of Existing Units	7
3.1.4 Conversion of Peaking Units	7
3.1.5 Voluntary Consumer Conservation	7
3.1.6 Construction of New Power Source	8
3.1.7 Selected Alternative	13
3.2 ALTERNATIVES AVAILABLE TO USEPA	13
3.2.1 Issuance of the Permit	13
3.2.2 Denial of the Permit	14
3.3 ALTERNATIVES AVAILABLE TO OTHER PERMITTING AGENCIES	14
3.4 IMPACTS OF THE APPLICANT'S ALTERNATIVES	15
3.4.1 No Action Alternative Impacts	15
3.4.2 Impacts of Selected Alternative	20
4.0 DESCRIPTION OF THE PROJECT	27
4.1 PROJECT LOCATION AND SITE CHARACTERISTICS	27
4.2 POWER PLANT DESCRIPTION	28
4.2.1 Power Generation Facilities	28
4.2.2 Fuel Requirements	28
4.2.3 Cooling Pond and Makeup Water System	30
4.2.4 Circulating Water System	31
4.2.5 Miscellaneous Water Systems	32
4.2.6 Auxiliary Facilities	33
4.3 POLLUTION CONTROL MEASURES	33
4.3.1 Air Pollution Control	33
4.3.2 Wastewater Treatment	35
4.3.3 Solid Waste Disposal	37
4.3.4 Noise Abatement	37
4.4 TRANSMISSION LINES	39

TABLE OF CONTENTS (Cont.)

	Page
4.5 POWER PLANT CONSTRUCTION	40
4.5.1 Construction Schedule	40
4.5.2 Construction Personnel Requirements	41
4.5.3 Construction Materials Requirements	41
4.5.4 Plant Construction Costs	42
4.5.5 Plant Construction to Date	42
4.5.6 Construction Impacts to Date	44
4.6 POWER PLANT OPERATION	51
4.6.1 Personnel Requirements	51
4.6.2 Plant Output	52
4.6.3 Operating Revenues and Expenses	52
5.0 IMPACTS OF THE PROJECT ON THE ENVIRONMENT	54
5.1 GEOLOGY	54
5.1.1 Topography	54
5.1.2 Surface and Subsurface Geology	54
5.1.3 Soil Characteristics	55
5.1.4 Impacts on Geology	56
5.2 HYDROLOGY	57
5.2.1 Water Resources	57
5.2.2 Water Quality	60
5.2.3 Water Supplies and Water Uses	68
5.2.4 Impacts on Hydrology	68
5.3. AIR QUALITY	72
5.3.1 Climatology	72
5.3.2 Dispersion Meteorology	72
5.3.3 Air Quality	76
5.3.4 Prevention of Significant Deterioration	78
5.3.5 Impacts on Air Quality	79
5.4 SOUND QUALITY	85
5.4.1 Existing Conditions	85
5.4.2 Impacts on Sound Quality	87
5.5 BIOLOGY	88
5.5.1 Aquatic Biota	88
5.5.2 Landscape Types	92
5.5.3 Terrestrial Wildlife	95
5.5.4 Endangered and Threatened Species	98
5.5.5 Important Biological Resources	100
5.5.6 Parks, Preserves, and Wildlife Refuges	100
5.5.7 Impacts on Biological Resources	100
5.6 ARCHAEOLOGY AND HISTORY	103
5.6.1 Archaeological and Historic Resources of the Project Area	103
5.6.2 Impacts on Archaeological and Historic Resources	106
5.7 SOCIOECONOMICS	108
5.7.1 Land Use	108
5.7.2 Population Center Characteristics	109
5.7.3 Transportation and Traffic	113
5.7.4 Impacts on Socioeconomics	113

TABLE OF CONTENTS (Cont.)

	Page
5.8 TRANSMISSION LINES	116
5.8.1 Existing Conditions	116
5.8.2 Impacts of Transmission Lines	117
6.0 COORDINATION	119
6.1 PUBLIC PARTICIPATION	119
6.2 LCRA PROJECT COORDINATION	119
6.3 PERMITS AND APPROVALS	119
6.3.1 Other Federal Requirements	120
6.3.2 Other State Requirements	120
6.4 CORRESPONDENCE	121
BIBLIOGRAPHY	128
APPENDIX A Draft NPDES Permit	A-1
APPENDIX B Biology Supporting Data	B-1

LIST OF TABLES

		Page
1.	Inventory of existing (1977) and projected (1999) power plant capacity by type in Texas	3
2.	Alternative plant site selection matrix for the Fayette Power Project	11
3.	Coal analysis for the Fayette Power Project	29
4.	Total annual and instantaneous emission rates of the Fayette Power Project	33
5.	Effluent limitations at the Fayette Power Project	36
6.	Fayette Power Project average monthly construction payroll	42
7.	Estimated construction noise on the Fayette Power Project Site	46
8.	Construction noise levels (dBA) at the Fayette Power Project Site	48
9.	Plant operation staffing requirements, Fayette Power Project, Units 1 and 2	51
10.	Annual operating and maintenance costs by unit, Fayette Power Project (1979-2010)	53
11.	General stratigraphic column of geologic formations in Fayette County	54
12.	Estimated mean daily and total annual volume of discharge for Cedar Creek	57
13.	Historical annual maximum instantaneous discharges for the Colorado River at La Grange, Texas	59
14.	Water chemistry data for the Fayette Power Project Site, June - August 1975	61
15.	Historical water quality of the Colorado River in the vicinity of the Fayette Power Project Site, Columbus, Texas	63
16.	Historical water quality of the Colorado River in the vicinity of the Fayette Power Project Site, Wharton, Texas	65
17.	Historical temperature data for the Colorado River in the vicinity of the Fayette Power Project Site	66
18.	Cedar Creek water quality on the Fayette Power Project Site, August 1977 - July 1978	67

LIST OF TABLES (Cont.)

Table		Page
19.	Cooling pond water quality, Fayette Power Project, July - August 1978	69
20.	Groundwater data for wells in Fayette County	69
21.	Stability array (STAR) results for Austin/Bergstrom Station	73
22.	Stability array (STAR) results for Houston/Hobby Station	74
23.	Mean seasonal and annual morning and afternoon mixing heights and wind speeds for all cases	75
24.	Summary of air quality monitoring at the Fayette Power Project Site	76
25.	Estimated air quality at the Fayette Power Project Site and ambient air quality standards	77
26.	Summary of compliance with PSD regulations for SO_2 and TSP in the Fayette Power Project vicinity	80
27.	Compliance of maximum and maximum second-highest air quality impacts of the Fayette Power Project with NAAQS	82
28.	Estimate of monthly distribution of natural and increased hours of fog at the Fayette Power Project	83
29.	Cases of fog and persisting fog at the Fayette Power Project	84
30.	Existing ambient noise levels at the Fayette Power Project Site	86
31.	Operational noise levels at the Fayette Power Project	88
32.	Population, economic, and public service characteristics of population centers in the vicinity of the Fayette Power Project	110
33.	Population by project area, county, and population center in the vicinity of the Fayette Power Project, 1975 - 2010	112
34.	Estimated levels of direct and induced employment resulting from construction and operation of the Fayette Power Project	115

LIST OF FIGURES

Figure		Follows Page
1	Alternative plant sites evaluated for the Fayette Power Project	10
2	Fayette Power Project location and surrounding population centers	27
3	Fayette Power Project plant layout and discharge points	27
4	Fayette Power Project plant power block	28
5	Transmission line routes and structures for the Fayette Power Project	39
6	Construction manpower projections for the Fayette Power Project	41
7	Topographic and hydrologic characteristics of the Fayette Power Project	55
8	Soil characteristics of the Fayette Power Project	56
9	Aquatic sampling locations at the Fayette Power Project	66
10	Wind rose for Austin, Texas	74
11	Noise sampling locations at the Fayette Power Project	85
12	Major vegetation types of the Fayette Power Project	92
13	Historic sites and roads within 10 miles of the Fayette Power Project	103
14	Cultural resources of the Fayette Power Project	103

1.0 INTRODUCTION

The U.S. Environmental Protection Agency (USEPA) is considering the issuance of a New Source National Pollutant Discharge Elimination System (NPDES) permit to the Lower Colorado River Authority for a fossil-fueled steam electric generating plant known as the Fayette Power Project. The Lower Colorado River Authority (LCRA) and the City of Austin (COA) are constructing the Fayette Power Project in response to the increasing demand for electric power. The two utilities each have a 50% interest in the project, but LCRA made application to USEPA for a discharge permit and is referred to as the applicant throughout the text. The project consists of two 600 MWe fossil-fueled steam electric generating units, both of which are partially constructed, located approximately seven miles east of La Grange, Texas. Three transmission lines, representing 121 miles of new or widened corridor, will extend from the plant to substations near Fayetteville, Austrop, and Lytton Springs.

USEPA has determined the proposed plant to be a new source in accordance with the Federal Water Pollution Control Act (FWPCA) as amended in 1977 (P.L. 92-500, as amended by P.L. 95-217). Cooling water discharge from the condensers will go into the cooling pond, then Cedar Creek, and eventually into the Colorado River. The continuous pond discharge into Cedar Creek as required by the Texas Water Rights Commission is 0.5 cfs. On 14 October 1976 LCRA applied to USEPA for an NPDES permit for the discharge from the cooling pond at the plant. The issuance of this permit has been determined to be a significant Federal action by USEPA.

In accordance with the requirements of P.L. 91-190, the National Environmental Policy Act of 1969 (NEPA), major Federal actions which significantly affect the quality of the human environment must be accompanied by a detailed statement of the environmental impacts of the proposed action. Accordingly, USEPA issued a Notice of Intent (NOI) to prepare an Environmental Impact Statement (EIS) on 27 July 1978. This draft EIS fulfills USEPA's responsibilities under NEPA and the Federal Water Pollution Control Act. A substantial portion of the information in this document was taken from the Environmental Assessment of the Fayette Power Project, Volumes 1, 2, and 3 which was required as part of LCRA's NPDES permit application.

2.0 NEED FOR THE PROJECT

This section briefly summarizes the national, State, and regional energy trends which have led to LCRA's decision to construct the Fayette Power Project. It follows the progression of events from the national level to the local level which has created LCRA's need for the project.

2.1 NATIONAL ENERGY TRENDS

The oil embargo of 1974 has caused the United States to seriously consider its energy supply and consumption priorities. Increasingly short supplies of domestic and imported gas and oil as well as drastically increased prices have forced this country to examine alternative energy sources. In response to this energy crisis, the Federal Energy Administration (FEA) analyzed various combinations of energy supply and demand as a means of estimating long-range energy needs (FEA 1974). Their findings included the following projections:

- Oil and natural gas will become increasingly scarce, and shale oil and synthetics from coal will be needed to make up for the long-term short-fall.
- Shale oil and coal synthetics, while having a limited impact in the short-term, will be required by 1985 and their use will continue to grow rapidly.
- Conservation, combined with shifts to alternate energy sources, will become imperative in the long-run.
- The oil and gas short-fall will be so large that major shifts in demand, most likely to electric power, will be needed in addition to conservation measures.
- Increased reliance on electric power implies dependence on nuclear power or other new sources, as well as improved conversion technologies.

The implications of these projected conditions to the electric utility industry are far-reaching. Over the past fifty years, the demand for electricity in the United States has doubled each decade, growing at a rate of approximately 7% per annum. Although this growth rate has slowed somewhat during the mid-1970's, the electric utility industry has had to prepare

for the conversion to alternate energy sources as well as the projected increased demand for electricity necessitated by oil and gas shortages. The urgency of the need to convert to alternate fuel sources combined with the relatively long planning and construction periods required for power plants has created an immediate need throughout the country for additional electric generating capacity. The overall result has been and continues to be the planning and construction of power plants which do not rely on oil and gas, instead shifting more heavily to nuclear and coal-fired plants. The effects of this conversion (as discussed in Sections 2.2 and 2.3) have filtered down to all levels of the industry and will create a major change in the entire energy consumption pattern of the country.

2.2 STATE AND REGIONAL ELECTRIC UTILITY TRENDS

The U.S. Department of Energy reported in their 1977 Inventory of Power Plants in the United States that Texas had an existing electrical output of 45,788 MWe. As indicated in Table 1, this existing inventory was comprised primarily of gas-fired generating capacity which represented approximately 85% of the total capacity. The projected power plant capacity in Texas for 1999 indicates a substantially heavier reliance on coal-fired and nuclear-powered plants and a significant reduction in the percentage of total capacity supplied by gas-fired plants.

Table 1. Inventory of existing (1977) and projected (1999) power plant capacity by type in Texas.

	1977		1999	
Type	MWe	Percent of Total	MWe	Percent of Total
Nuclear	0	0.0	7,996	11.1
Hydro	390	0.8	422	0.6
Oil	1,340	2.9	1,927	2.7
Coal	4,449	9.7	20,370	28.4
Gas	38,899	85.0	39,462	55.0
Other	710	1.6	1,610	2.2
Total	45,788	100.0	71,787	100.0

SOURCE: U.S. Department of Energy. 1977. Inventory of power plants in the United States. Office of Utility Programs. Washington, D.C.

This projected shift in Texas away from oil and gas-fired plants is in line with national energy trends. As discussed in the preceding section, the impending shortages of oil and gas are forcing electric utilities toward the use of alternative fuels such as coal, lignite, oil shale, and nuclear power. In Texas, the need for this conversion is heightened by the Texas Railroad Commission's order (Gas Utilities Docket No. 600) which requires the curtailment of natural gas usage in power plant boilers. The 1976 order required that no new contracts for the sale of natural gas for boiler fuel purposes be entered into after the effective date (17 December 1975) of the order (subject to several exceptions for new facilities). In addition, the order required that current users reduce their natural gas consumption 10% by 1981 and an additional 25% by 1985. The result of this order has been to force electric utilities to quicken their search for alternative fuel sources for new power plants and to add additional capacity where necessary to make up for the reduction in capacity of natural gas-fired plants.

At the regional level, the need for additional generating capacity is also imminent. The two major electric reliability councils in Texas are the Southwest Power Pool (SWPP) and the Electric Reliability Council of Texas (ERCOT). A 1976 study by the Federal Power Commission (FPC) indicated that the SWPP's electric generating capacity will fall below an acceptable range by 1981, and by 1985 the reserve margin will be down to an extremely low level. Currently, ERCOT has an operable capability of 35,459 MWe and a peak demand of 26,819 MWe (August 1977), resulting in a reserve margin of approximately 8,600 MWe (By telephone, Harold Tynan, ERCOT, 12 November 1978). Projections by ERCOT indicate reserve margins of 10,132 MWe for 1980 (peak demand of 32,212 MWe, operable capacity of 42,444 MWe) and 9,790 MWe for 1985 (peak demand of 41,825, operable capacity of 51,615 MWe). Although these ERCOT reserve margins are well above industry averages, much of this reserve capacity is produced by gas-fired plants operating at capacity. Since the Texas Railroad Commission gas curtailment order will require a 35% reduction in gas usage in these plants by 1985, the reserve margins are in effect substantially lower than those indicated in the ERCOT figures unless these gas-fired plants are converted to alternate fuel sources. Consequently, the demand for electric generating capacity at the regional level

further reinforces LCRA's need for the project.

2.3 APPLICANT'S NEED FOR THE PROJECT

The Lower Colorado River Authority (LCRA) and the City of Austin (COA) Electric Utility are members of the Texas Interconnected Systems and the Electric Reliability Council of Texas. LCRA provides wholesale electric power to 11 cooperatives and 30 cities and retail electric power to three cities and several pipeline and manufacturing facilities in southeastern Texas. The COA utility supplies electric power to the City and nearby areas.

As is the case with most utilities, LCRA and COA are faced with the need to meet the increasing demands for electricity by their customers. During the past decade, the demand for electric power from the two utilities has increased by approximately seven percent per year. Numerous interrelated factors including unseasonable weather conditions, increased development and population growth, and the price of alternative fuels have created this increased demand. The projections prepared by the utilities analyzed each of these factors to forecast electric generation demand.

The projections for LCRA indicate that a total system demand of 1,300 MWe will be realized by 1979 and a total of 1,520 MWe by 1982. Similar projections for the COA indicate a total system demand of 1,136 MWe by 1984. Currently, LCRA's present system consists of 1,185 MWe of electric power generation (995 MWe of gas units and 190 MWe of hydroelectric), and the COA electric system consists of approximately 1,000 MWe (all gas fueled). The projected demand compared to present capacity necessitates that additional capacity be provided. The need for additional capacity becomes more critical when the effects of the Texas Railroad Commission's order requiring the curtailment of natural gas usage in power plant boilers is considered. As a result, LCRA and the COA are constructing 1,200 MWe of electric generating capacity with a future site potential of 3,000 MWe in order to replace existing capacity which will be lost due to the natural gas phase-out and to meet projected additional demand.

3.0 ALTERNATIVES

This section discusses the alternatives considered by LCRA in planning the Fayette Power Project and the alternatives available to EPA and other permitting agencies with regard to their regulatory functions concerning the project. The impacts of the various alternatives, including the no action alternative, are also summarized in this section.

3.1 ALTERNATIVES CONSIDERED BY THE APPLICANT

The alternatives considered by LCRA prior to initiating construction of the Fayette Power Project fall into two major categories: those requiring no new generating capacity and those requiring the construction of new capacity. The various alternatives included in each of these categories are discussed in the following sections.

3.1.1 No Action

The increasing demand for electricity in the LCRA and the City of Austin service areas necessitates an increase in the overall available electrical capacity of the region. As discussed in Section 2.3, both utility systems require additional electricity supplies to meet future customer demands and to comply with the Texas Railroad Commission's gas curtailment order. If additional electricity is not available to meet these requirements, the projected deficiency would degrade current levels of electrical service in the region and reduce economic growth and productivity. Therefore, a no action alternative was not considered as a viable alternative.

3.1.2 Purchase or Exchange of Power

The purchase or exchange of electrical power with nearby utilities requires the availability of surplus generating capacity from their systems. During recent years, however, other nearby utilities in Texas and the south-central region have experienced growth patterns similar to that of LCRA and the City of Austin. Many of these utilities are finding it necessary to

construct additional generating facilities to meet the increased demand in their own service areas. As a result, the purchase or exchange of electrical power is not a viable alternative currently since there are no reliable sources of surplus capacity from utilities which could exchange or sell power to LCRA.

3.1.3 Reactivation or Upgrading of Existing Units

The reactivation of existing units is not a viable alternative for LCRA since no units of substantial capacity are or can be anticipated to become inactive. The upgrading of older units to meet the large capacity increase required by the utilities is infeasible from an engineering standpoint. Virtual rebuilding of the plants would be required to increase their capacity, and in some cases, to convert them to an alternate fuel source. Consequently, the reconstruction of these plants was considered to be less efficient than new construction.

3.1.4 Conversion of Peaking Units

The conversion of peaking units to baseload operations would help to meet the energy requirements if unneeded peaking units were available. However, neither LCRA nor the City of Austin has unneeded peaking units. Currently, system reserves are maintained to allow for load forecast errors, equipment failures, forced outages during peak periods, and similar circumstances. As a result, the conversion of peaking units would be impractical since it would reduce the peaking capability below acceptable reserve requirements.

3.1.5 Voluntary Consumer Conservation

It is difficult to assess the effects of voluntary consumer conservation programs on electricity usage. In the past, voluntary energy conservation in the LCRA and the City of Austin service areas has reduced energy consumption slightly, and this impact was considered in projecting load-growth. However, reduced demand realized by voluntary conservation measures has been and will continue to be countered by increased demand from new residential, business,

and agricultural users. As a result, while voluntary conservation may help to lower the overall demand for electric load growth, it cannot be considered as a viable alternative to increased baseload generation. Voluntary conservation will, however, reduce the total amount of baseload capacity required, and this factor has been considered in the sizing of the Fayette Power Project.

3.1.6 Construction of New Power Source

After determining that no viable non-structural alternatives existed for meeting the demand for electricity in the service area, LCRA concluded that new generating facilities must be constructed. The selection of the Fayette site and design involved the consideration of alternative power sources, alternative sites, and alternative design configurations which are discussed in the following sections.

3.1.6.1 Alternative Power Sources

Six alternative power sources and their required generating methods were evaluated by LCRA to determine the most feasible fuels and fuel sources for the new power generation facility (BPC 1974a). The evaluations concluded that the use of solid fuels was the most suitable alternative for the Fayette Power Project because of environmental, economic, and timing considerations. This finding was based on the following observations:

- The use of natural gas would allow siting of the power plant nearer to the market areas and with less adverse environmental impacts. However, the use of natural gas in Texas as a boiler fuel for new power plants has been eliminated under the Texas Railroad Commission's Curtailment Order (TRC 1975).

- The use of nuclear power, although supportive of national energy policies, requires approximately 10-12 years for licensing, design, and construction which would not allow it to be on line by 1979 to meet the projected demand. In addition, while nuclear power has a number of environmental benefits resulting from the lack of air and water pollutants, the handling and storage of radioactive materials poses a potential safety problem.

- The use of oil, although permitting siting of the plant nearer to the market areas, currently has limited availability and is relatively high priced. The environmental effects of using oil are

not significantly different than those resulting from the use of solid fuels.

- Although geothermal energy is relatively low in environmental effects and inexpensive to use, there are no geothermal energy sources in the vicinity of the LCRA or the COA service areas.

- Solar energy is virtually inexhaustible and emission free. However, solar energy development is still in the conceptual phase, and proven technology for large scale commercial applications is not available.

The investigation of solid fuels for the Fayette Power Project focused on Texas lignite and low-sulfur western coal. A large lignite deposit on the former site of Camp Swift near the project was sampled and found to contain high quality lignite. However, development of the site in time for use by the Fayette Power Project was found to be infeasible. A court injunction resulting from a suit filed by the National Resources Defense Council against the Department of Interior initially delayed competitive bidding for a mineral lease on the site. A subsequent hardship declaration for the Camp Swift site excluding it from the injunction and a 1977 amendment to the Federal Surface Mining Act have now opened up the site to competitive bidding by any public utility. If LCRA can obtain the leasing rights to the site, it plans to utilize the local lignite source to meet future fuel needs resulting from plant construction, conversions, and expansions.

The chosen fuel source, western coal, has a higher heating value and a lower moisture, ash, and sulfur content in relation to weight than Texas lignite and other coal types. As a result, it was determined that capital and operational savings would be realized by using the western coal since costly air and solid waste pollution abatement systems would be less extensive for the western coal than for lignite or other coal types. Since emissions when using western coal are not expected to exceed the current Federal and State environmental regulations and its use is economically advantageous, western coal was selected as the preferred fuel source for the Fayette Power Project.

3.1.6.2 Alternative Plant Sites

Twenty-two feasible power plant sites were evaluated for the Fayette Power Project (BPC 1974a). During the preliminary screening, only six

sites were found to have the necessary size and economic characteristics to warrant further consideration. These six sites (Figure 1) were evaluated and rated with respect to environmental factors, geology, distance to the load centers, and suitability for staged development for each site in comparison to a general plant and cooling pond layout for each site. The results of this qualitative evaluation (Table 2) indicate that the advantages of the Cedar Creek and Wilbargers Creek sites are relatively equal in comparison to the other four sites.

The final site selection was based primarily on development costs and fuel transportation costs which favored the Cedar Creek site. As indicated in the Site Selection Study: Oil/Coal/Lignite Power Plant, the Cedar Creek site offers the following advantages (BPC 1974a):

- Staged development which would allow the initial development of two 600 MWe units while retaining the potential for further development of the site to 3000 MWe.
- Lower fuel transportation costs than four of the other five sites for lignite and relatively equal transportation costs for western coal.
- Lowest development cost of the six alternative sites.
- Least number of environmentally sensitive areas, due primarily to favorable geologic characteristics and low groundwater infiltration.
- Lowest cost per kilowatt generated.

In general, the Cedar Creek site offers more options to LCRA at a lower cost than any of the other sites evaluated, including great flexibility in regard to phased development and alternative fuel sources.

3.1.6.3 Alternative Design Considerations

The only alternative facility design considered for the Fayette Power Project was for the cooling system. The various cooling systems evaluated included once-through cooling; wet cooling towers; dry cooling towers; wet/dry cooling towers; cooling ponds; and evaporative cooling with zero liquid

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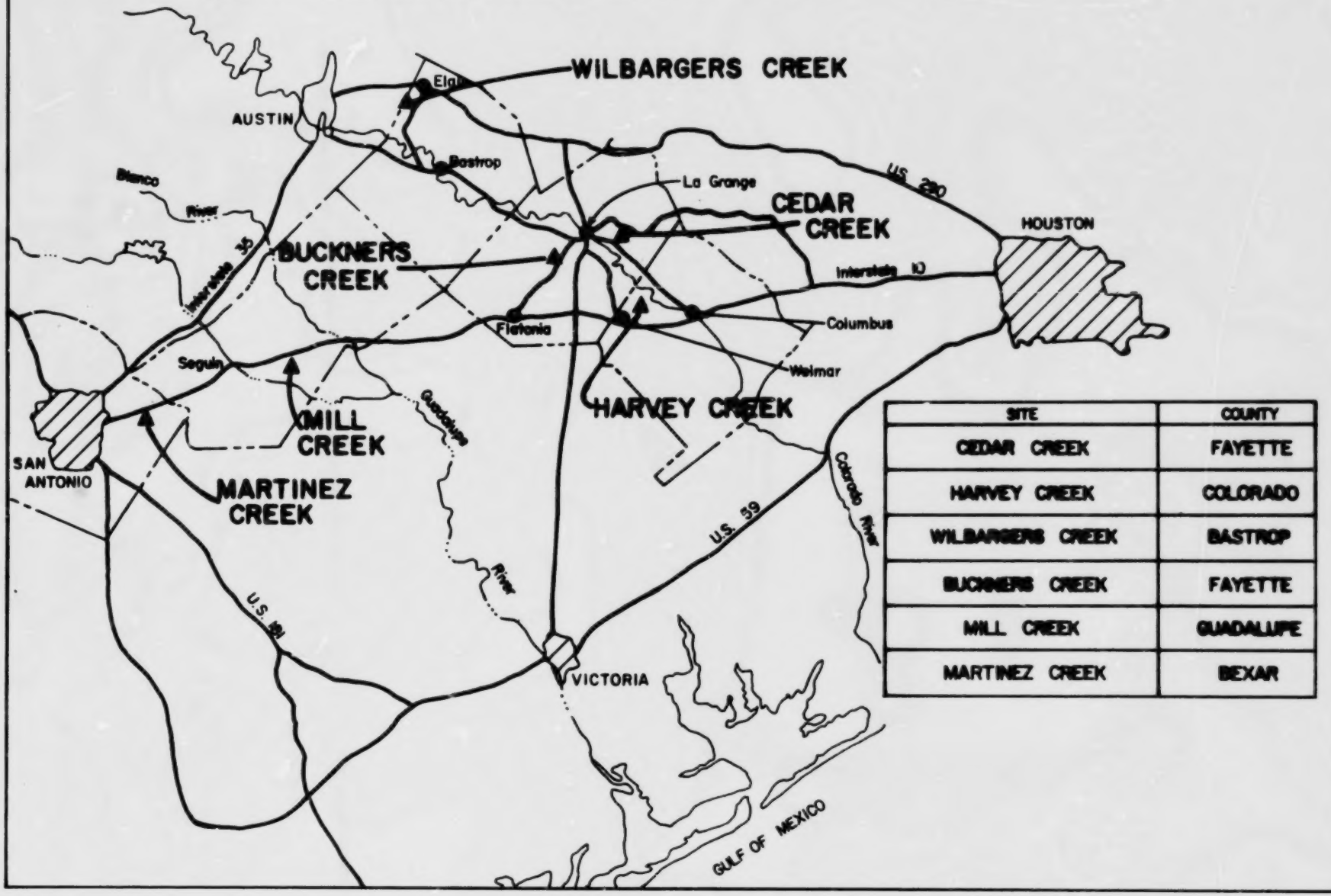
Figure 1. Alternative plant sites evaluated for the Fayette Power Project (LCRA 1978a).



SITE	COUNTY
CEDAR CREEK	FAYETTE
HARVEY CREEK	COLORADO
WILBARGERS CREEK	BASTROP
BUCKNERS CREEK	FAYETTE
MILL CREEK	GUADALUPE
MARTINEZ CREEK	BEXAR

Table 2. Alternative plant site selection matrix rating for the Fayette Power Project.

Site	Environmental Factors									
	Air Quality[1]	Fogging[2]	Land Use[3]	Ground-water Infil-tration[4]	Total Env. Factors	Geology[5]	Distance To Load Center[6]	Staged Development[7]	Total	Rank
Cedar Creek	3.0	2.0	2.5	3.0	10.5	3.0	3.0	3.0	19.5	I
Wilbargers Creek	2.5	3.0	3.5	2.0	11.0	2.5	3.5	2.0	19.0	II
Buckners Creek	3.0	2.0	2.0	3.0	10.0	2.0	2.0	2.0	16.0	III
Harvey Creek	3.0	1.5	2.0	2.0	8.5	2.5	2.5	2.0	15.5	IV
Mill Creek	2.0	1.0	2.0	1.5	6.5	1.5	2.0	2.0	12.0	V(Tie)
Martinez Creek	1.0	1.0	1.5	3.0	6.5	2.0	1.5	2.0	12.0	V(Tie)

[1] The rating of the air quality is a measure of the relative impact that a new power plant would have on existing air quality.

[2] The ratings indicate the relative effect the cooling pond fog may have on surrounding features.

[3] This rating measures the existing or potential demands that may be put on the land for some other use.

[4] The ratings indicate the relative potential for groundwater infiltration at each site.

[5] The ratings reflect the potential for seepage, the availability of materials for construction, and the adequacy of the ground for foundations.

[6] The rating reflects the distance of the site from the projected load centers.

[7] The rating reflects the ease with which staged development can be accomplished.

Rating Scale

4.0	Excellent	2.0	Fair
3.5	Good to Excellent	1.5	Poor to Fair
3.0	Good	1.0	Poor
2.5	Fair to Good		

SOURCE: Bechtel Power Corporation. 1974. Site selection study: oil/coal/lignite power plant. Houston TX. Plate 18.

discharge. Each of these systems was reviewed with respect to maximizing cost-effectiveness and minimizing adverse environmental effects. The comparison of these alternatives found the cooling pond to be the most feasible from an economic and environmental point of view. This conclusion was based on the following findings:

- Once-through cooling systems, although low in overall consumption of water, do use large quantities of water. The temperature of water returned to its natural water body may be increased by as much as 39 F, severely affecting the aquatic habitat. These characteristics, in addition to the relatively high capital costs of transporting the water, made once-through cooling a non-viable alternative.

- Wet cooling tower systems generally are subject to high construction costs, reduced plant capacity, and potentially adverse environmental effects from fogging, icing, salt deposition, and drift. The additional considerations of increased construction costs required at the Cedar Creek site to prevent damage to the towers from hurricanes and tornadoes and the reduced efficiency resulting from high humidity in the area eliminated this system as a viable alternative.

- Dry cooling tower systems require virtually no makeup water and eliminate the mixing of cooling water and condensate. However, the use of this system is limited to areas with low humidity which is not characteristic of the project area.

- Wet/dry cooling systems are conservative in water use and more environmentally sound than wet towers. However, they are generally the most expensive type of cooling system and in the case of the Fayette Power Project, would severely reduce plant capacity due to the need for low relative humidity.

- Cooling ponds, although requiring relatively large areas of land, allow maximum plant operating capacity at a cost substantially lower than cooling towers. The construction costs of the towers are eliminated, and the environmental effects of salt deposition, drift, and plume visibility also are eliminated.

- Evaporative cooling systems with zero liquid discharge are expensive to construct and operate, and do not significantly reduce the environmental effects associated with other evaporative cooling systems. Although the means for solidifying the blowdown release are proven, their long-term reliability and serviceability under the conditions of treating power plant blowdown have not yet been fully demonstrated. In addition, the use of this type of system for the Fayette site would require the ultimate off-site disposal of solid or semi-solid wastes.

Since the use of a cooling pond would allow the Fayette Power Project to operate at capacity and within the guidelines established by Federal and State regulatory agencies, it was selected as the most feasible cooling system alternative for both economic and environmental considerations.

3.1.7 Selected Alternative

LCRA selected a coal-fired power plant at the Cedar Creek site as the most feasible alternative for meeting their current electric generation needs. The two 600 MWe generating units will utilize a 2,400 acre cooling pond for the cooling system. The Cedar Creek site provides LCRA with the capability of expanding to 3,000 MWe on the site with the future addition of Units 3 and 4. However, this EIS only addresses the impacts of Units 1 and 2 which currently are under construction (Section 3.4). If the Fayette Power Project is expanded to 3,000 MWe, the cumulative impacts of all four units will be evaluated at the time of application for a New Source NPDES permit.

3.2 ALTERNATIVES AVAILABLE TO USEPA

The alternatives available to USEPA in accordance with its regulatory and permitting authority pursuant to Section 402 of the Federal Water Pollution Control Act are to issue or deny the New Source NPDES permit requested by LCRA for the Fayette Power Project's discharge into the Colorado River. Conditional requirements or modifications to the permit based on anticipated project impacts may be added to the permit, if warranted.

3.2.1 Issuance of the Permit

Issuance of the New Source NPDES permit (copy of draft permit is attached as Appendix A) will allow the Fayette Power Project to operate as described in Section 4.0 and to discharge wastewater into the Colorado River. The draft NPDES permit sets forth effluent limitations and monitoring requirements for the power plant discharge. This draft permit may be modified to require additional monitoring and/or more or less stringent effluent limitations based on comments received during the NEPA review process. Impacts resulting

from the issuance of the permit are summarized in Section 3.4.2 and discussed in detail in Section 5.0.

3.2.2 Denial of the Permit

USEPA can deny LCRA's application for a New Source NPDES permit if the agency determines that the proposed discharge will violate effluent limitations or if violations of the Texas water quality standards are anticipated. Furthermore, USEPA could deny the permit if environmental considerations such as endangered species, historic and/or archaeologic sites, wetlands, floodplains, etc., are significantly impacted and measures for mitigating these impacts are unacceptable. Should the permit application be denied by USEPA, LCRA could abandon the project, locate and evaluate another site, redesign the project to operate without a discharge, or modify the project so that the discharge would meet the water quality standards.

Based on the current extent of construction and the economic loss to LCRA which would result from abandoning the project or evaluating another site, it is likely that LCRA would attempt to redesign their facilities to meet the effluent limitations.

3.3 ALTERNATIVES AVAILABLE TO OTHER PERMITTING AGENCIES

All other permits required for project construction and initial operation from State or Federal agencies already have been approved and received. The U.S. Army Corps of Engineers has issued the construction permit required for the pumping station on the Colorado River (Section 10, River and Harbor Act of 1899) and has waived Section 404 (FWPCA, as amended) permit requirements for the Cedar Creek Dam. The Texas Department of Water Resources has approved the Water Quality Waste Control Order which is the State equivalent of the NPDES permit. The only remaining permit to be obtained is the operating permit from the Texas Air Control Board which must be applied for within 30 days after the first day of operation. Section 6.0 summarizes all other permits approved and received for the project.

3.4 IMPACTS OF APPLICANT'S ALTERNATIVES

The alternatives remaining available to LCRA will be determined by USEPA's decision on the NPDES permit application. Even though LCRA has proceeded with project construction, the possibility for a denial of the permit by USEPA still exists. The denial of the permit would create a no action alternative or at best, a delay in project completion and operation. If the permit is issued by USEPA, the impacts resulting from the project will be those of the selected alternative. These impacts are summarized in Section 3.4.2.

3.4.1 No Action Alternative Impacts

The no action alternative typically is defined as the applicant not proceeding with the project at the chosen location, instead either abandoning the project or reevaluating alternative sites and/or designs. In this case, LCRA has at their own risk initiated construction prior to permit approval. As a result, the no action alternative (should USEPA deny the permit) translates into one of several courses of action for LCRA:

- LCRA could pursue no further action on the Cedar Creek site, instead abandoning the project at this location and reevaluating other sites and designs.
- LCRA could redesign the Fayette Power Project pollution control facilities in order to meet the water quality and effluent standards which would govern permit approval.

Since LCRA has already invested a considerable amount of time and money into the Fayette project, it is likely that they would redesign the project to conform with permit requirements. This course of action would require an additional capital expenditure by LCRA and would result in a delay in project completion.

If LCRA should decide that the project cannot meet the permit requirements and pursues no further action at the Cedar Creek site, the project impacts would be those resulting from the construction activities to date as discussed below.

3.4.1.1 Geologic Impacts

Approximately 3,000 acres have been altered by plant construction. Changes in topography, natural drainage patterns, and soil conditions have occurred, many of which cannot be restored to pre-project conditions. Erosion from site preparation and construction activities, although not excessive, has on a short-term basis increased sedimentation in Cedar Creek. However, the use of erosion and sediment control measures during construction has limited the extent of this impact.

3.4.1.2 Hydrologic Impacts

The impoundment of Cedar Creek and the filling of the cooling pond has not adversely affected the project area, although a major change in Cedar Creek from a running water to a standing water system has occurred in the stretch above the dam. Water withdrawal from the Colorado River to fill the pond has not adversely affected the flow of the River, and this withdrawal has been approved by the Texas Water Rights Commission. LCRA is required to maintain a minimum of 0.5 cfs continuous flow into the Creek which will continue its intermittent flow, but with less variation in flows. The formation of the cooling pond also has impacted groundwater resources in the project area by becoming a recharge area. The current level of total dissolved solids in the cooling pond is substantially lower than that of the groundwater resources. As a result, the quality of the groundwater has not been adversely affected.

3.4.1.3 Air Quality Impacts

No significant changes in air quality have resulted from site preparation and construction. Fugitive dust, exhaust emissions, and smoke from on-site open burning have been abated largely by watering construction areas to control dust, maintaining equipment and vehicles in good working condition, and locating open burning to minimize the effect on nearby activities. Pollutant concentrations above background levels have been largely localized in nature and of short duration.

3.4.1.4 Sound Quality Impacts

Construction activities on site resulted in no increase in noise levels at the nearest residence to the project site. The construction noise level at the cooling pond intake (the point of closest public approach) was 4 dB above ambient levels which is barely noticeable and has had no impact on daily activities at this location. Noise impacts from transmission line construction have thus far been minimal due to the short-term nature of the activity.

3.4.1.5 Biologic Impacts

The primary biologic impact which has occurred during plant construction is the loss of terrestrial biological productivity. The project includes approximately 3,000 acres of which nearly 97% supported some kind of vegetation. The various construction activities have eliminated much of this vegetation along with the animal communities it supported. However, because no critical habitats of any endangered or threatened plant or animal species were found on the project site, the removal of the commonly occurring vegetation types will not have any significant impact on wildlife species or habitat diversity. The formation of the cooling pond has increased the aquatic productivity of the area and has created a more unique aquatic habitat for the area. The cooling pond, due to its nutrient-rich water, has greater biological productivity than most natural lakes.

3.4.1.6 Archaeologic and Historic Impacts

The Texas Antiquities Code was followed and utilized to protect and preserve the historic and archaeological resources identified on the Fayette Power Project site. A total of 19 prehistoric and 12 historic and cemetery sites was identified on the project site. Six of these sites were further evaluated and tested and the results of these surveys were fully documented. Three historic structures were removed from the site intact and relocated to other sites prior to construction. The Biegel-December House and the Legler Log House were moved to the Winedale Inn Historic Complex. The

Legler Log House was put into storage and the Biegel-December House was reconstructed. The Gentner-Kroll-Polasek Farmstead was sold to private individuals and moved from the site to various locations in Texas. The architectural details of the two structures in Winedale have been recorded and complete sets of measured drawings and photographs were prepared. As a result, construction activities did not adversely affect the major historic and archaeologic structures and sites in the project area, although potential historic research on less important sites was presumably lost during construction.

3.4.1.7 Socioeconomic Impacts

Project construction has permanently converted 3,000 acres of agricultural and pasture land to an industrial use. Approximately 700 acres of this land were classified as prime farmland and will be irretrievably lost for this purpose because reclamation to pre-project soil conditions will not be possible. The formation of a 2,400 acre cooling pond has added a unique regional natural resource which will provide a much needed recreational area. The removal of the project site from the tax rolls has resulted in small annual decreases in property and school taxes which will be offset by increased sales tax revenues from the sale of electric power.

The project area has been able to accommodate the increased demand for housing, schools, and other community services necessitated by the construction labor force and the associated population growth. The anticipated peak labor force of 611 workers (mid-1978) has increased to a short-term (4 months) level of approximately 889 workers. Upon completion of Unit 1, the construction labor force will decline to approximately 300 workers and the resultant demands on the population centers of the project area will lessen accordingly. The local and regional economies have benefited from higher employment levels, the local purchase of goods and services for plant construction, and from the increased disposable income of construction workers and induced secondary employment.

Approximately 5.5 miles of Highway 159 were relocated due to the construction and filling of the cooling pond. This relocation was paid for

by LCRA and resulted in no significant adverse impacts on the environment or local residents.

3.4.1.8 Transmission Line Impacts

The construction of the transmission lines has had minimal impacts on hydrology, biology, and geology. Natural drainage patterns have been altered and short-term increases in erosion have occurred. Clearing activities have disturbed some faunal habitats and some loss of plant and animal life is likely. However, revegetation measures have been applied to completed areas, and the resultant growth will increase habitat diversity. Construction noise has had minimal effects due to its short-term nature, and the aesthetic impacts have been minimized by using existing corridors wherever possible.

3.4.1.9 Other NEPA Impacts

In accordance with the requirements of NEPA, the EIS must address the effect of the project on short-term and long-term productivity and the irreversible and irretrievable commitments of resources. During the construction phase of the Fayette Power Project, the following impacts on productivity and resources have occurred:

- Approximately 3,000 acres of land have been removed from long-term productivity. If the project were not completed, it is unlikely that pre-project topographic and soil conditions could be duplicated. However, since this land was primarily used as unimproved pasture, no significant loss in agricultural productivity has occurred.

- Removal of the 3,000 acre project site and 4,500 acres for future expansion from the tax rolls has resulted in a long-term impact on property and school taxes. However, the tax losses are insignificant compared to total taxes collected.

- The impoundment of Cedar Creek has affected the vegetation and wildlife in the portion of the Creek lying upstream of the dam. While there has been a long-term loss of terrestrial biological productivity in this area, it has been replaced by increased aquatic biological productivity. In addition, the overall loss of terrestrial productivity is negligible since similar habitats and species are abundant elsewhere in the region.

- The formation of the cooling pond has increased the long-term availability of groundwater in the project area by changing Cedar Creek from a discharge to a recharge area.

- Plant construction has presumably altered those historic and archaeological sites on the project which were not investigated and/or removed. Although these sites were not considered by the Texas Archaeological Survey to be of major historical significance, information from them has been permanently lost.

- Resources committed to the project during construction include the land, construction materials and labor, and the financial resources of LCRA. All land is committed to the project for its 30 year life, although other compatible uses may be developed. The construction materials used are not significant when compared to available resources regionwide and nationwide. The financial commitment by LCRA of approximately $454 million is irreversibly committed to the project.

3.4.2 Impacts of Selected Alternative

If USEPA issues the NPDES permit, the Fayette Power Project will operate as described in Section 4.0. The impacts resulting from the issuance of the permit would be those construction impacts discussed in Section 3.4.1 and the impacts of operation (as discussed in Section 5.0) as summarized below.

3.4.2.1 Geologic Impacts

Once project construction is completed, there will be little impact on geology resulting from plant operation. Partial restoration of the project site will restore pre-project topography, drainage patterns, and vegetation where possible. However, major excavations and some structures will remain on the site permanently. The aesthetics of the area will be altered, but the cooling pond will offer some scenic attraction which will offset other modifications to the site landscape.

3.4.2.2 Hydrologic Impacts

The present water quality of the cooling pond, Cedar Creek, and the Colorado River is similar to pre-project conditions. Total dissolved solids in the cooling pond and Cedar Creek fall in a range of 324 to 442 mg/l,

chlorine ranges from 53.6 to 99.0 mg/1, and pH ranges from 8.0 to 8.52. However, power plant operations may alter water quantity and quality, particularly in Cedar Creek and the cooling pond. An average monthly withdrawal from the Colorado River of 36 cfs for makeup water will not affect the flow or productivity of the River, and the 0.5 cfs continuous discharge from the pond should maintain a more consistent flow in Cedar Creek. Releases from the pond for blowdown could contribute dissolved metals such as iron, lead, manganese, and aluminum to the Creek during pond stratification periods. However, proper monitoring and operation of the variable intake depth discharge system should prevent significant discharges of dissolved metals. Other water quality standards including those for temperature and chlorine also are expected to be met.

Groundwater resources are not anticipated to be adversely affected by plant operation. The total dissolved solids (TDS) and chlorine levels of the cooling pond during worst case operating conditions will not exceed the 900 mg/1 and 1,100 mg/1 permit limits for TDS or the 0.2 mg/1 and 0.5 mg/1 permit limits for chlorine. Since these anticipated operating levels of TDS and chlorine are lower than current groundwater levels of these pollutants, cooling pond seepage into the groundwater table should not reduce groundwater quality. Groundwater withdrawal from induced development is expected to be minimal, resulting in no adverse impact on groundwater quantity. No impacts from the 100-year flood are anticipated.

3.4.2.3 Air Quality Impacts

The ambient concentrations of emissions from the Fayette Power Project are anticipated to be well within the National Ambient Air Quality Standards for sulfur dioxide, nitrogen dioxide, carbon monoxide, and particulate matter (See Table 27). Hydrocarbon and oxidant levels also should be in accordance with the appropriate standards. Atmospheric emissions from fugitive dust will be confined to the project site through air pollution control measures such as wet sprays and a bag filter collection system. The evaporation of water and the dissipation of heat from the cooling pond will increase fog formation in the project area, but will not cause increased ice formation.

In accordance with the Prevention of Significant Deterioration (PSD) regulations, LCRA has shown that the operation of Unit 2 will not cause a violation of Class II air quality deterioration increments of sulfur dioxide and total suspended particulate matter, not have an impact on the air quality of any Class I areas, not cause a violation of NAAQS, and be designed to include the Best Available Control Technology to reduce sulfur dioxide and total suspended particulate matter emissions. Unit I is not subject to these PSD regulations since the construction permit was obtained prior to the effective date.

3.4.2.4 Sound Quality Impacts

The operation of the Fayette Power Project will not adversely impact the adjoining land uses and nearby residences. The only incidence of a significant increase in noise levels is the point of closest public approach; however the 4 dB daytime and 9 dB nighttime increase at this location should not be noticeable. The minimally increased sound levels at the location of the nearest residences will be imperceptible.

3.4.2.5 Biologic Impacts

The potential biologic impacts of plant operation center around the Colorado River, Cedar Creek, and the project site. The makeup water intake structure on the Colorado River is not expected to have a measurable impact on the aquatic species (shiners, sunfish, shad, carp) of the River due to the small volume and velocities of water withdrawn and the intake screen configuration.

The primary impact on Cedar Creek has been the conversion of several miles of intermittent stream habitat (lotic) to a cooling pond (lentic). The leaching of inundated soils and vegetation has produced nutrient-rich water in the pond which has increased biological productivity. The fish species (sunfish, shiners, mosquito fish) which were characteristic of the riffle habitats of Cedar Creek probably will not reproduce in the cooling pond, but those species characteristic of the pool habitats in Cedar Creek

will survive and reproduce in the pond. The temperatures predicted for the pond should allow for the development of a good warm water recreational fishery. In addition, the pond will likely be utilized by diverse waterfowl populations.

Below the cooling pond, the biology of Cedar Creek should remain similar to that which existed prior to impoundment. The intermittent nature of the stream is likely to continue, but with a more consistent flow. The potential discharge of dissolved iron and other metals to the Creek may reduce benthic and algal productivity and hence fish abundance in the portion of the Creek directly affected by the precipitates. However, it is unlikely that toxic effects would occur. Blowdown release water quality will be monitored, and if a proper withdrawal scheme is developed, mitigation of potential adverse effects can be achieved.

The loss of future terrestrial biological productivity resulting from the cooling pond construction and filling will be replaced by the increased aquatic productivity of the pond. No major impacts on remaining site and surrounding area vegetation are anticipated from air pollutants. Since there are no plant or animal species known to be endemic to the project area and the site does not provide important or critical habitat for any endangered or threatened species, the plant operation should have no adverse impacts on any important biological habitats.

3.4.2.6 Archaeologic and Historic Impacts

The impacts on archaeological and historical resources on the project site have occurred during the construction phase. All major historic structures were removed intact and important historic and prehistoric sites were investigated and recorded before construction activities were initiated. The preservation work completed by LCRA was coordinated with the State and performed in accordance with the appropriate State guidelines. The operation of the project is not anticipated to have any adverse visual effects on historic places within a 10-mile radius of the site.

3.4.2.7 Socioeconomic Impacts

The 2,400 acre cooling pond will be developed by LCRA into a regional recreational area for fishing, boating, and other passive recreational activities. Neither the plant development and operation nor the recreational development is expected to induce any secondary growth impacts other than the limited development of housing which occurred during the construction phase. During plant operation, increased sales tax revenues of approximately $5.7 million annually will be realized by Fayette County and the City of Austin.

As construction work is completed, the construction labor force will be replaced by an operational staff of 230 employees. These operating employees are anticipated to permanently relocate within the 30 mile project area and increase the project area population by an estimated 730 people. This increased population is not expected to adversely impact housing, schools, or other services in the project area since a larger construction phase population increase has already been accomodated without significant impacts. Approximately 327 secondary job opportunities are projected to result from plant operation. The total increase in disposable income resulting from these 557 new jobs is projected to be over $152 million over the 30 year operating life of the project.

Increased highway and rail traffic from project operation are anticipated, but will not create any significant traffic problems.

3.4.2.8 Transmission Line Impacts

Non-structural uses will be permitted in the transmission line corridors, and revegetation measures will be applied to those areas not used for agricultural activities. As a result, the corridor will not remove appreciable amounts of land from productive use. Right-of-way maintenance may have some short-term impacts on plants, but the corridors generally are expected to increase faunal and habitat diversity.

3.4.2.9 Other NEPA Impacts

During the operation of the Fayette Power Plant, the following impacts on short-term and long-term productivity and the irreversible or irretrievable commitment of resources are anticipated.

- Short-term deterioration of air quality will occur from plant emissions. However, the emissions will comply with State and Federal regulations and not have long-term effects after the useful life of the plant. On a short-term basis, the climate of the area will be altered due to increased fog occurrence.

- The use of low-sulfur western coal will help meet the energy needs of the region while also meeting air quality regulations. The use of this coal will reduce the drain on other less plentiful fuel sources and provide additional lead time for the development of alternative energy sources.

- Plant operation will result in a long-term increase in tax revenues from the sale of electric power to retail and wholesale customers.

- Long-term use of the water resources of the Colorado River will be necessary for cooling pond makeup water. However, the average requirement of 36 cfs will not affect the long-term productivity of the River.

- The water quality of Cedar Creek, the cooling pond, and the Colorado River will be minimally affected by plant operations. Some increases in total dissolved solids, chlorine, and temperature are likely, but these discharges are expected to be well within the water quality standards. No toxic effects which would reduce biological productivity or prevent current uses of these water bodies are anticipated.

- The loss of approximately 700 acres of prime farmland on the site will not affect short-term agricultural productivity. However, on a long-term basis, the conversion of this prime farmland is likely to be irreversible since pre-project soil conditions probably will not be duplicated after the useful life of the project.

- The development of a fishing, boating, and passive recreation area on-site will increase the area's available recreational resources on a long-term basis.

- The aquatic biological productivity of the region will be increased on a long-term basis due to the nutrient-rich nature of the cooling pond. The pond should provide a good warm water recreational fishery which will increase the diversity and abundance of fish in the region.

- Long-term terrestrial habitat diversity will be increased by the transmission line corridors and the revegetation measures applied to them.

- Long-term impacts on the socioeconomic characteristics of the project area will result from the increased project-induced population. The local and regional economies will receive long-term benefits resulting from more jobs, increased disposable income, and associated multiplier effects.

- The four million tons per year fuel requirement for the project will represent an irretrievable use of resources. However, the energy produced from this coal will increase the long-term economic productivity of the region.

- The financial resources committed by LCRA to plant operation will be irretrievably lost for other uses, but will be recovered through the annual revenues of project operation.

4.0 DESCRIPTION OF THE PROJECT

This section describes the project location, facilities, construction, and operation, including a summary of construction to date and its impacts.

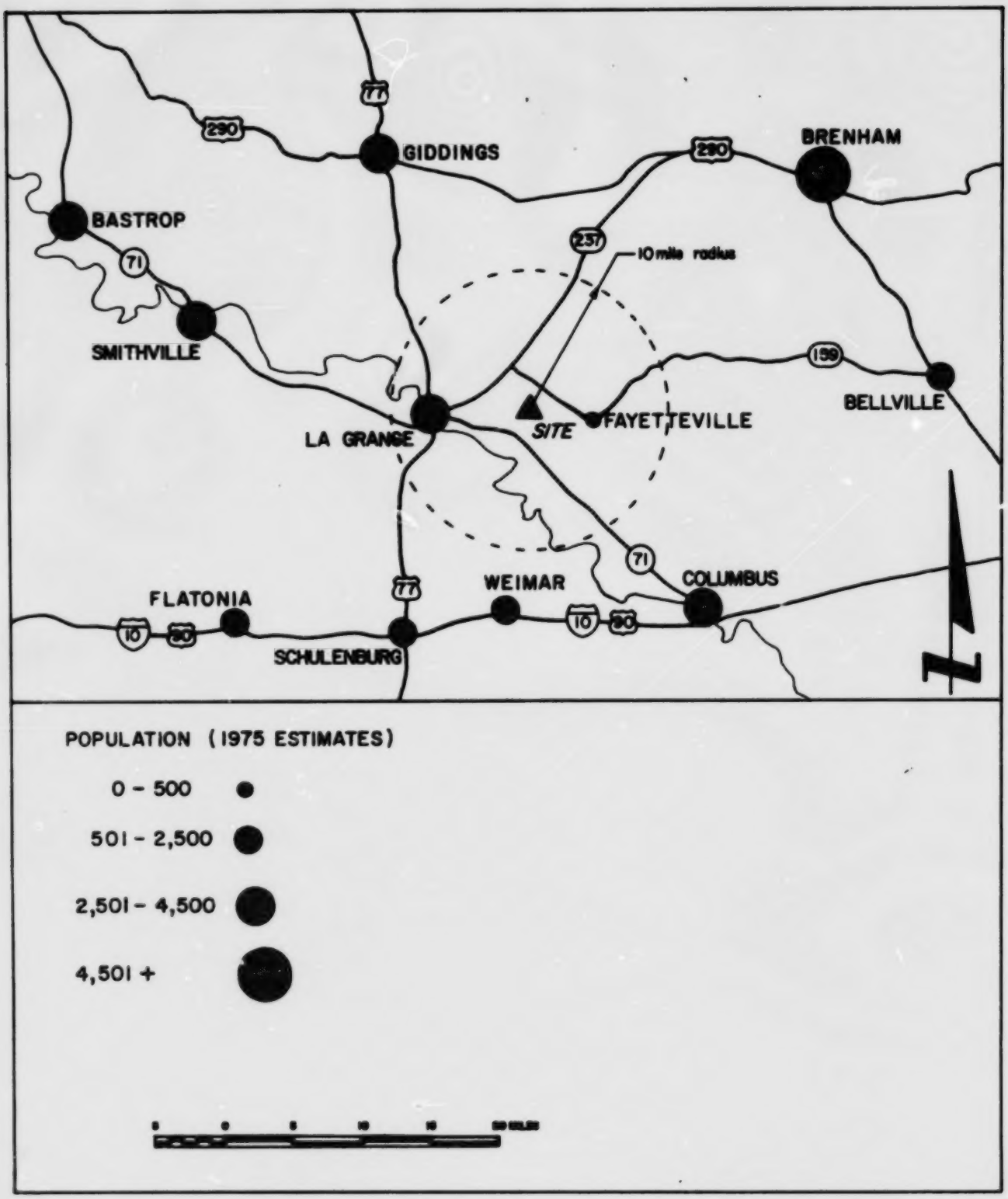
4.1 PROJECT LOCATION AND SITE CHARACTERISTICS

The Fayette Power Project is located approximately seven miles east of La Grange, Texas on the Cedar Creek site (Figure 2). The total land area required for the project is approximately 3,000 acres including a 2,400 acre cooling pond on Cedar Creek. The remaining 600 acres will be used for the two generating units and related facilities, auxiliary structures, railroad and highway access, a 345 KV switchyard, and storage areas (Figure 3). An additional 1,321 acres of land will be required for new and expanded transmission line corridors. The makeup water intake structure on the Colorado River and the nearly four miles of pipeline to the cooling pond utilize small additional amounts of land.

The terrain at the plant site and cooling pond consists of gently rolling hills with elevations ranging from approximately 300-400 feet above sea level. Prior to construction, the project area was heavily wooded in some areas with the remainder used primarily for livestock grazing. The construction activities and filling of the cooling pond have necessitated the relocation of a portion of Texas Highway 159, a 12 inch diameter gas pipeline, and a 69 KV transmission line. The plant site is located close to the cooling pond to minimize water intake and discharge line distances. Site access is provided via an upgraded existing road originating at Texas Highway 71 southwest of the plant site and a spur line of the Missouri-Kansas and Texas Railroad.

The Cedar Creek site is suitable for future expansion through the development of a second cooling pond directly west of the plant site on Baylor Creek. LCRA has already acquired the additional 4,500 acres of land required for this expansion.

Figure 2. Fayette Power Project location and surrounding population centers (adapted from LCRA 1978a).



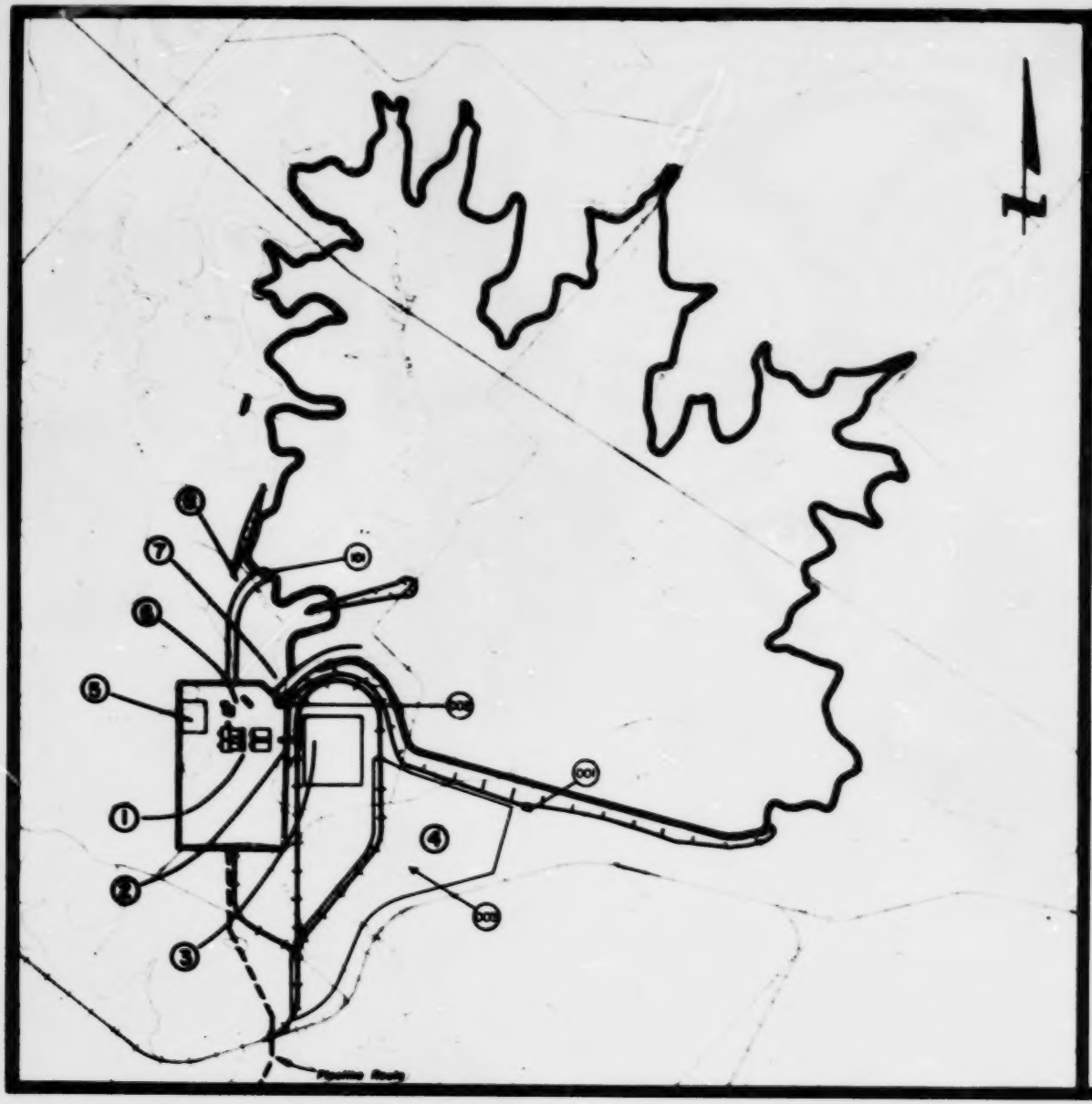


Figure 3. Fayette Power Project plant layout and discharge points (adapted from LCRA 1978a).

LEGEND

- Cooling Pond Discharge
- Oily Waste Treatment Discharge
- Coal Storage Area Runoff Discharge
- Cooling Water Canal Discharge
- Power Block
- Coal Handling Area
- Emergency Coal Pile
- Ash Storage
- 345kv Switchyard
- Administration and Service Buildings
- Intake Structure
- Discharge Structure

4.2 POWER PLANT DESCRIPTION

4.2.1 Power Generation Facilities

The power block for each of the two 600 MWe generating units will consist of a boiler (steam generator), a steam turbine generator, a main condenser, deaerator, and control equipment (Figure 4). The boilers are outdoor, enclosed structures with the turbine generator and most of the other heat cycle equipment enclosed in the turbine building. They are controlled circulation, balance-draft boilers designed to burn both pulverized coal and lignite and oil. The boilers are designed to provide 4,200,000 lbs/hr of steam at 2,400 psig, 1000 F primary and 1000 F reheat to a tandem compound, four-flow, reheat type turbine generator rated at 551,922 KW. Each unit also includes two half-capacity induced-draft fans.

The main condenser is a dual pressure type arranged parallel with the turbine generator. It provides the mechanism for condensing the steam exhausted from the turbine by rejecting waste heat from the steam to the circulating water system (Section 4.2.4). The water produced by condensing the turbine exhaust steam is collected in the condenser hotwell and then pumped through a series of low pressure feedwater heaters to the deaerator. The feedwater heaters extract steam from the turbine and heat the feedwater on its return to the boiler. The discharge from the main feedwater pump passes through two high pressure feedwater heaters and then to the boiler economizer section.

4.2.2 Fuel Requirements

The primary fuel for Units 1 and 2 will be low sulfur Western Powder River Basin sub-bituminous coal (Table 3). The coal for Unit 1 will be acquired from the East Decker Mine in southern Montana. Unit 2 will utilize coal obtained from the Coal Creek or Black Thunder Mines near Gillette, Wyoming. A 25 year contract for 50 million tons of coal at $7 per ton for Unit 1 has been agreed to, while a 15 year contract for 27 million tons of coal at $6.15 per ton for Unit 2 has been arranged. When

Figure 4. Fayette Power Project plant power block (LCRA 1978a).

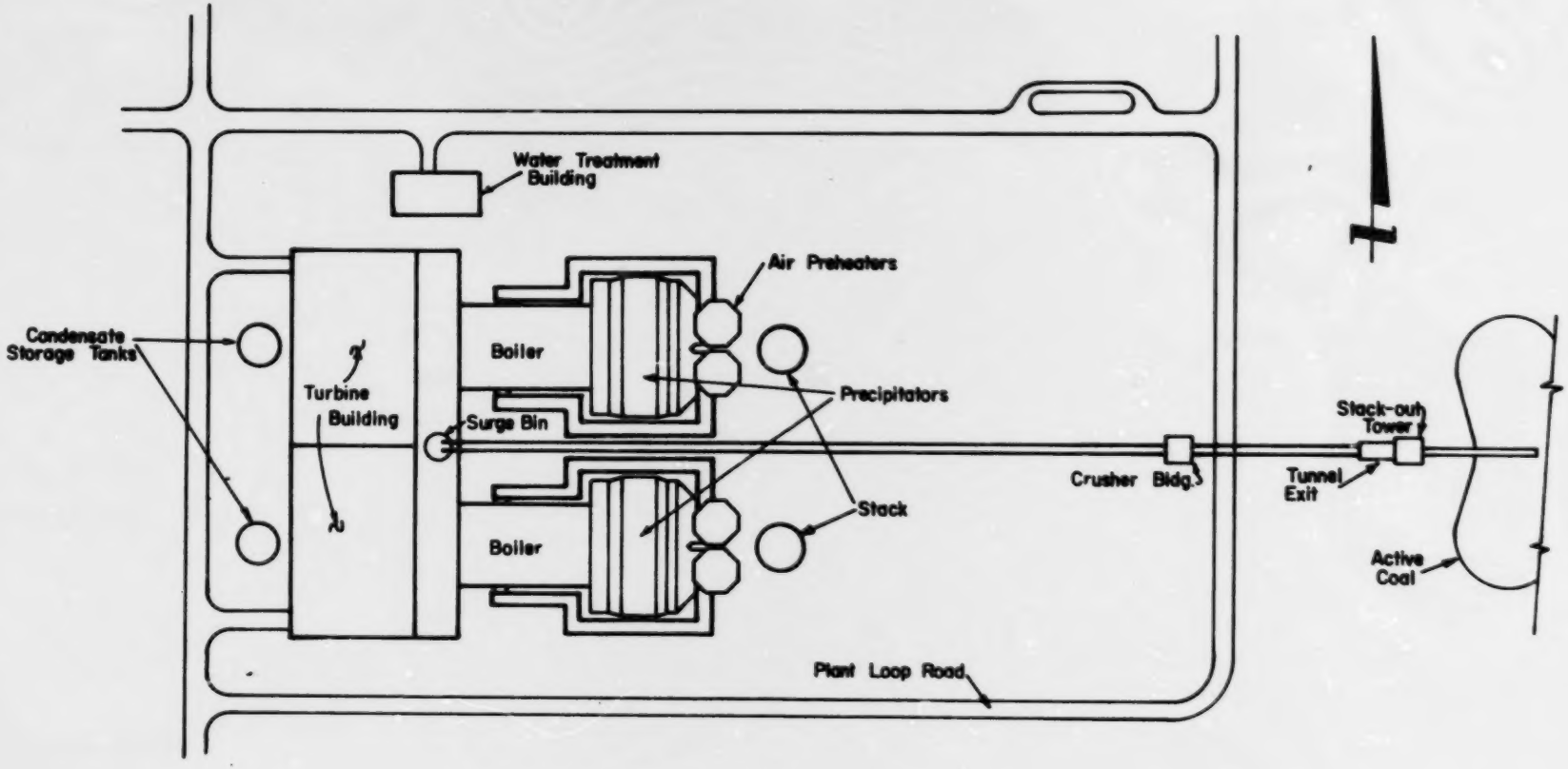


Table 3. Coal analysis for the Fayette Power Project.

	Unit #1 East Decker Coal		Unit #2 Coal Creek Coal		Unit #2 Black Thunder Coal	
	Avg. Weight (Percent)	Range Min.-Max. Weight (Percent)	Avg. Weight (Percent)	Range Min.-Max. Weight (Percent)	Avg. Weight (Percent)	Range Min.-Max. Weight (Percent)
Proximate Analysis (As Received)						
1. Moisture	24.71	24.00-28.00	32.00	28.00-36.50	28.00	24.00-33.00
2. Ash	4.30	4.00- 9.00	6.00	4.50- 7.40	4.90	3.20- 5.60
3. Non-sulfur volatile matter	31.27	30.60-31.95	30.16	25.76-32.05	31.86	28.79-34.53
4. Sulfur	0.49	0.40- 0.54*	0.34	0.24- 0.45	0.34	0.21- 0.47
5. Fixed Carbon, %	39.23	39.00-39.36	31.50	26.00-33.50	34.90	31.50-37.50
6. Heating Value, BTU/lb	9,238	9,000-9,365	8,000	7,400-8,400	8,500	7,900-9,000

* The LCRA contract with the supplier of East Decker coal guarantees that the maximum sulfur content will not exceed 0.54% by weight.

SOURCE: Lower Colorado River Authority. 1978. Environmental assessment of the Fayette Power Project. Volume 1. Austin TX. p. 2-6.

both units are fully operational, approximately 350 tons of coal per hour, or 2.5 million tons per year, will be required when operating at 55% of capacity (BPC 1974a). A 45 day reserve supply will be constantly maintained in the 750,000 ton capacity coal storage yard.

The coal will be shipped by rail in unit trains of up to 110, 100-ton rail cars. At full capacity, there could be as many as two trains every 24 hours, six days per week. The unloading of the 110 car train into an underground concrete hopper will require approximately four hours. The coal will then be transported by conveyer to the crusher house where it will be crushed and moved to the plant surge bin. From there, the coal will be moved to the units' storage silos which supply the six pulverizers feeding each boiler. The pulverized coal will be mixed with air and blown into the furnace.

4.2.3 Cooling Pond and Makeup Water System

All water required for the operation of Units 1 and 2 will be obtained from the Cedar Creek cooling pond and treated as required for the various facilities. The initial fill and makeup water for the cooling pond is provided by a pumping station on the Colorado River four miles south of the plant site. This water is pumped through a 42 inch diameter pipeline which supplements the annual drainage into the Cedar Creek watershed and is designed to provide both fill and makeup water for Units 3 and 4 (if the project is expanded) without disturbing the operation of Units 1 and 2. The average monthly makeup pumping rate of 36 cfs and the maximum monthly average makeup pumping rate of 50 cfs represent 1.7% and 2.4% of the median flow at the intake location, 1.4% and 2.0% of the average annual flow, and 12.0% and 17.0% of the 7-day low flow of the Colorado River respectively. No diversions will be made from the River if they will reduce the flow below 200 cfs at the point of diversion.

The cooling pond has been created by constructing an earth-filled dam across Cedar Creek and filling the area behind the dam to an elevation of 390 feet MSL, providing a water surface area of nearly 2,400 acres (72,000

acre-feet of volume). A baffle dike extending approximately 4,400 feet into the pond has been built to separate the circulating intake and discharge channels. The main embankment and saddle dikes are at an elevation of 401 feet MSL to prevent wave overtopping and have an internal drainage system installed to prevent deterioration from seepage.

The reservoir outlet and spillway functions have been incorporated into a single intake control tower structure of two vertical concrete channels with a pond intake port, a remotely operated 2 ft. x 2 ft. gate (to control normal releases), and a 4 ft. x 4 ft. remotely operated gate at the base (to control emergency discharges and reservoir drawdown). A stilling basin is required to reduce the discharge velocity of 20 feet per second resulting from the probable maximum flood flow of 1,030 cfs with the 4 ft. x 4 ft. gate open. This discharge of approximately 10 fps is further reduced over a riprapped section of the channel to 2-3 fps.

The initial continuous pond discharge of 0.5 cfs will be controlled by the small 2 ft. x 2 ft. gate as will the increased blowdown flow beginning after the seventh year of operation. The maximum flow through this gate at a normal water elevation of 390 feet MSL will be approximately 47 cfs and does not represent a significant discharge velocity.

Sedimentation in the cooling pond is not anticipated to reduce storage capacity by a significant amount over the life of the project. Rainfall runoff and makeup water will add approximately 435 acre-feet of sediment to the reservoir over the life of the plant (10 years of operation at 1,200 MWe plus 30 years of operation at 3,000 MWe), which represents only 0.6% of the total capacity (72,000 acre-feet). An analysis of sediment particle size indicates that silting in the circulating water system is unlikely since the high velocities will prevent the small particles from settling out.

4.2.4 Circulating Water System

The circulating water system draws water from the cooling pond through the intake channel and into the intake structure. The intake structure contains three one-third capacity cooling water pumps for each unit for a

total capacity of 570,000 gpm at 0.5 fps, auxiliary cooling water pumps, trash racks, traveling water screens, screen wash pumps, and a chlorination system. Through consultation with USEPA the intake channel has been widened to reduce the potential for impingement.

Water is pumped from the intake through 108 inch diameter pipelines to the condenser, and the water is discharged to the opposite side of the baffle dike to allow dissipation into the atmosphere by conduction, radiation, and evaporation as it circulates through the pond. Chlorine will be added to the system (to control condenser fouling) according to the following schedule:

- Summer - three 30 minute periods per day at 3 ppm Cl_2, 280,000 gpm water flow.
- Winter - one 30 minute period per day at 3 ppm Cl_2, 191,000 gpm water flow.
- Spring and Autumn - two 30 minute periods per day at 3 ppm Cl_2, 280,000 gpm water flow.

Based on measurements taken at other LCRA power plants on the Colorado River, appreciable amounts of free chlorine are not anticipated to enter the pond or the Colorado River.

4.2.5 Miscellaneous Water Systems

In addition to water for the circulating water system, the cooling pond also will provide the water required for boiler makeup, fire service, and service uses. Water for these systems is pumped by separate pumps in the intake structure and chlorinated where required. The makeup feedwater for the boiler is demineralized and stored. Fire water pumps will provide water to the entire plant fire protection system through underground fire drops with hydrants, fire hose stations, deluge spray systems, and sprinkler systems.

4.2.6 Auxiliary Facilities

In addition to the power generation facilities and the cooling pond, the Fayette Power Project site will contain an administration building, a machine shop, a warehouse, an automotive maintenance shop, and miscellaneous yard buildings for personnel, material, and equipment.

4.3 POLLUTION CONTROL MEASURES

4.3.1 Air Pollution Control

Flue gases from the boiler furnaces contain most of the emissions expected from the Fayette Power Project. Harmless carbon dioxide, nitrogen, oxygen, and water are the primary constituents of flue gas, but it also contains significant amounts of sulfur dioxide (SO_2), suspended particulates (TSP), various oxides of nitrogen (NO_x), and small amounts of carbon monoxide (CO) and hydrocarbons (HC). USEPA New Source Performance Standards (NSPS) and the Texas Air Control Board (TACB) regulations require that the emission rate of SO_2, TSP, NO_x, CO, and HC be regulated. Ground level concentrations of these pollutants are also regulated (Table 4). Based on operation of the system at 70% of its rated capacity, the rate and annual emission of significant pollutants is projected to be as follows.

Table 4. Total annual and instantaneous emission rates[1] of the Fayette Power Project.

Pollutant	Unit 1 (tons/yr)	Unit 2	
		Coal Creek Coal (tons/yr)	Black Thunder Coal (tons/yr)
SO_2	19,523	20,680	20,222
TSP	550	530	547
NO	11,987	12,524	12,524
CO	951	1,210	1,131
HC	285	363	341

Table 4. Total annual and instantaneous emission rates[1] of the Fayette Power Project. (cont.)

	Unit 1	Unit 2		
		Coal Creek Coal	Black Thunder Coal	
		Emission Rate		NSPS[2]
Pollutant	($lb/10^6$BTU)	($lb/10^6$BTU)	($lb/10^6$BTU)	($lb/10^6$BTU)
SO_2[3]	1.14	1.16	1.13	1.20
TSP[4,5]	0.03	0.03	0.03	0.10
NO_x[6]	0.70	0.70	0.70	0.70
CO[4]	0.056	0.068	0.063	-
NC[4]	0.017	0.020	0.019	-

(1) All emission rates are based on operation at maximum continuous rating and a "worst case" coal having a maximum ash and sulfur content.

(2) USEPA Standards of Performance for New Stationary Sources (40 CFR 60 as amended by 42 FR 61537).

(3) Based on assumption that 95% of sulfur in coal is emitted in flue gas as SO_2.

(4) Calculated using USEPA emission factors (Office of Air Quality Planning and Standards 1973).

(5) After electrostatic precipitator (collecting efficiency greater than 99.4%).

(6) Based on assumption that emissions will meet NSPS.

SOURCE: Lower Colorado River Authority. 1978. Environmental assessment of the Fayette Power Project. Volume 1. Austin TX. p. 2-19.

To assure no contravention of air quality standards at ground level, flue gases from each unit will be discharged through a 600 foot high, 22 foot diameter stack. Sulfur dioxide (SO_2) emissions will be controlled by the use of low sulfur coal so that flue gas desulfurization facilities will not be required. Using controlled combustion in the boilers, NO_x emissions will be kept within required limits. Suspended particulates in the form of fly ash must be physically removed from the flue gas before discharge. This will

be done using a "cold" electrostatic precipitator on each stack which is 99.4% efficient in removing the particulates.

Fugitive emissions of air pollutants also occur during the unloading and handling of coal and during handling of fly ash. Coal will be sprayed with water during unloading and at all feeder points, crushers, and conveyors to control coal dust. The air will be filtered through cloth filter bags in the rotary car dumper building, weighing building, crusher building, surge bin house, silo gallery and in all underground tunnels. Fly ash from the flue gas and boiler economizers will be entrapped in a water vacuum and sent to the ash transfer tank for eventual mixing with the boiler bottom ash and disposal in the ash pond.

LCRA has been collecting background air quality data since October 1977 to establish baseline air quality conditions at the site. During operations of the plant, the air will be continuously monitored for SO_2, NO_2, and NO_x at three locations around the site. Twenty-four hour TSP samples will be collected every third day. Other meteorological data such as wind speed and direction, temperature, precipitation and radiation also will be continuously collected. Monitoring data will be reported to regulatory agencies quarterly as a compliance check and summarized in a yearly report.

4.3.2 Wastewater Treatment

Wastewater from the Fayette Power Project site will be discharged from the cooling pond, coal storage runoff, and oil waste treatment facility (Figure 3). The cooling pond system described in Section 4.2 will discharge cooling water blowdown to Cedar Creek at a minimum rate of 0.5 cfs, an average rate of 10 cfs, and a maximum rate of 47 cfs. The cooling pond receives no pollutants other than heat and chlorine which is added to the intake water to control condenser fouling. Chlorine doses to the intake will be controlled to prevent free residual chlorine concentrations at the end of the discharge canal from exceeding 0.5 mg/l (Table 5). Makeup water for the cooling pond containing an average of 300 mg/l total dissolved solids (TDS) is obtained from the Colorado River. TDS concentrations in the cooling pond will increase as cooling pond water is recirculated through the plant.

Controlled release of cooling water blowdown from the pond will be practiced to keep TDS concentrations within permit limitations (Table 5). Maximum cooling pond effluent temperature is not expected to exceed 95 F. The discharge is not projected to raise TDS concentrations in the Colorado River to more than 500 mg/l on an annual average or temperature to more than 95 F.

Table 5. Effluent limitations at the Fayette Power Project.

	Average	Maximum
Discharge (001)		
Cooling Pond		
Temperature	-	35 C (95 F)
Total dissolved solids*	900 mg/l	1,100 mg/l
Discharge (101)		
Canal to cooling pond		
Free available chlorine	0.2 mg/l	0.5 mg/l
Discharge (002)		
Floor and Yard drains		
Total suspended solids	30 mg/l	100 mg/l
Oil and grease	15 mg/l	20 mg/l
Total suspended solids*	65 mg/l	110 mg/l
Oil and grease*	18 mg/l	25 mg/l
Discharge (003)		
Coal storage runoff		
Total suspended solids	40 mg/l	50 mg/l
Total suspended solids*	45 mg/l	60 mg/l

* The Fayette NPDES Permit contains special effluent limitations denoted above by an asterisk (*). These special average values are violated when two of three, four, or five grab samples taken on separate days exceed the special average permit value. If a grab sample exceeds the special maximum permit value, it will constitute a violation.

SOURCE: Texas Water Commission. 1978. Permit No. 02105. Austin TX.

Stormwater runoff from the coal storage area may contain significant concentrations of suspended solids and will be diverted to a settling basin sized to hold runoff from two consecutive 100 year storms. Storm water will

be released from the surface of the pond to a tributary to Cedar Creek when suspended solids are less than 50 mg/l and pH is 6-9. In the event of a massive storm, excess storm water will discharge over the settling basin spillway to protect the levee. Runoff from uncontaminated areas of the plant will be discharged directly to Cedar Creek from a storm sewer system.

Drainage from oil contaminated areas of the plant site will be passed through an oil-water separator and air flotation unit prior to discharge to Cedar Creek via the uncontaminated storm water drain system. The treatment system should reduce oil and grease and suspended solids to 20 mg/l and 30 mg/l respectively for the average expected flow of 55,000 gpd. Effluent pH will be adjusted to a range of 6-9, if necessary.

4.3.3 Solid Waste Disposal

Boiler bottom ash and fly ash comprise the bulk of the solid waste to be generated at the Fayette Power Project. Ash from the boilers will be crushed, mixed into a slurry with water, and sent to the ash transfer tank where it will be mixed with fly ash from the electrostatic precipitators. From the ash transfer tank, the ash mixture will be pumped to a clay lined, 77 acre disposal and recycle pond with no discharge. This pond also will receive some boiler blowdown, metal cleaning waste, laboratory waste, sanitary sewage, demineralizer regeneration waste, clarifier sludge and process area drainage. Sanitary sewage will receive secondary biological treatment and disinfection prior to discharge into the pond. After settling and neutralization, some of the water will be reused within the plant. The pond is designed to handle the expected 725 tons/day of solids to be generated by the plant and still be capable of retaining a 100 year flood and one year of average runoff. Mechanical evaporation will be used to remove any net accumulation of water in the pond if natural evaporation should prove inadequate.

4.3.4 Noise Abatement

Noise due to operation of the Fayette Power Project is projected to be kept at a minimum level by compliance with the following noise exposure

standards recommended by the Occupational Safety and Health Administration:

Maximum Noise Level Exposure (dBA)	Time (hr)
90	8
95	4
100	2
105	1
110	½
Max. 115	¼ or less

SOURCE: U.S. Department of Labor. 1974. Occupational noise exposure standards. 29 CFR Part 1910. Washington DC.

Principal sources of operational noise at the project site are expected to be forced and induced draft fans, coal handling equipment, control valves, high velocity steam lines, turbine exhaust ducts, relief valves, steam control valves and pumps for boiler feed water, and makeup water and cooling pond recirculation. The following measures will be taken to keep operational noise from these principal sources within the OSHA standards:

- Forced draft fans and primary air fans will be installed in a sound-enclosing room to reduce noise level outside of the room to 85 dBA. For short-term occupancy inside the room, earmuffs will be furnished and required to be worn.
- Induced draft fans will be mounted in the ductwork and will be insulated to meet noise levels.
- Coal handling equipment such as conveyors, pulverizers and crushers will be fitted with sound boxes where needed. Sound suppression devices will be utilized to reduce noise from the rotating coal car dumper.
- All motors will be specified not to exceed 85 dBA at a distance of one meter from the motor surface, with the sound level to be determined in accordance with industry standards.
- The pipelines downstream of the control valves will be insulated or have in-line silencers.
- Noise from high velocity pipelines will be controlled by engineering selection of velocity and insulation of lines.

- The auxiliary turbine exhaust duct design will incorporate the lowest possible velocity, turning vanes and an exit diffuser to reduce noise. Insulation will also be utilized to reduce noise if required.

- No noise treatment is contemplated for the relief valve stacks because of their intermittent operation.

- Insulation and metal lagging will be provided as required on the boiler feed pump dependent on results of start-up noise levels.

- Insulation will be installed as required on the main turbine steam control valves.

The only other significant sources of noise from the project will be increased road and rail traffic. No noise abatement devices in addition to those normally installed on trucks, cars, and trains are expected to be necessary.

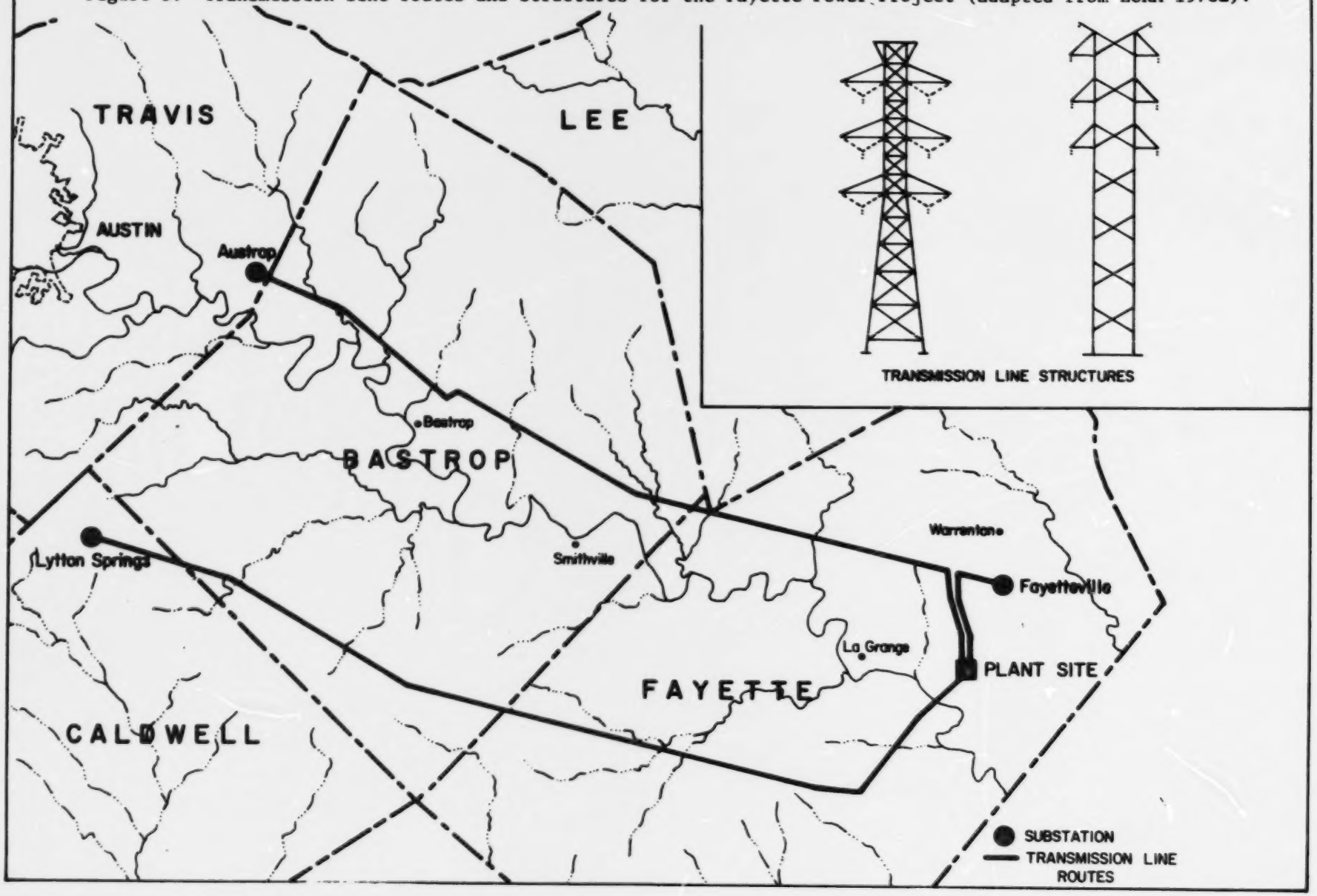
4.4 TRANSMISSION LINES

The transmission line facilities for the Fayette Power Project consist of three major segments. These three segments will add approximately 121 miles of transmission corridor to the existing system, consisting of 1,031 acres of land for new right-of-way and 290 acres of land for widening existing corridors. All of the new transmission lines will be 345 KV and will originate from a 345 KV switchyard on the plant site.

The routes chosen for the transmission line corridors (Figure 5) were selected primarily on the basis of connecting with existing lines and substations in the most economically feasible manner. As a result, there was not a great amount of latitude for alternate route considerations with the exception of minor variations along the chosen routes in order to avoid sensitive or difficult land areas. The major characteristics of each segment are briefly summarized below:

(1) Fayetteville Substation - This 200 foot wide corridor will extend north from the plant site and will contain lines for both the Austrop and Fayetteville segments. The corridor will extend approximately 4.5 miles

Figure 5. Transmission line routes and structures for the Fayette Power Project (adapted from LCRA 1978a).



until it intersects with an existing corridor (to be widened by 85 feet) which leads to the substation. This segment will require 109 acres of land. The towers for the parallel lines will be approximately 80 feet apart and spaced every 1,300 feet.

(2) Austrop Substation - This line will utilize the Fayetteville Substation line for 4.5 miles and then utilize existing corridors for 37 of the remaining 50 miles to Austrop. Existing corridors will be widened by 30-75 feet to accommodate the new line and the new corridor segment will require a 100 foot right-of-way. This segment will require an additional 446.5 acres of land. The average distance between towers is approximately 900 feet.

(3) Lytton Springs Substation - All 63 miles of this corridor will require new right-of-way of 100 feet in width. The corridor will require 764 acres of land. Average distance between towers will be 1,300 feet.

Two basic transmission line tower structures (Figure 5) will be used for the new 345 KV lines. The first type of structure consists of latticed steel with double circuit 345 KV phase to phase voltage. The base of this tower will be 30 feet square and will range in height from 136 to 166 feet. The second tower type to be used will also be of steel construction, ranging in height from 120 to 150 feet.

4.5 POWER PLANT CONSTRUCTION

4.5.1 Construction Schedule

Construction of the Fayette Power Project is estimated to take five years to complete. The construction was started in mid-1975 with projected operational dates for Units 1 and 2 of June 1979 and June 1980 respectively. The initial construction schedule calls for trial operation of Unit 1 by March 1979 and Unit 2 by March 1980. To date there has been relatively little deviation from this original schedule and commercial operation of Unit 1 should begin according to schedule.

The tasks involved with the various phases of plant construction have been scheduled to coincide with equipment deliveries and phased construction techniques. Where possible, the schedule has been developed and followed in an effort to minimize site disturbance, equipment conflicts, and potential environmental impacts due to seasonal weather conditions.

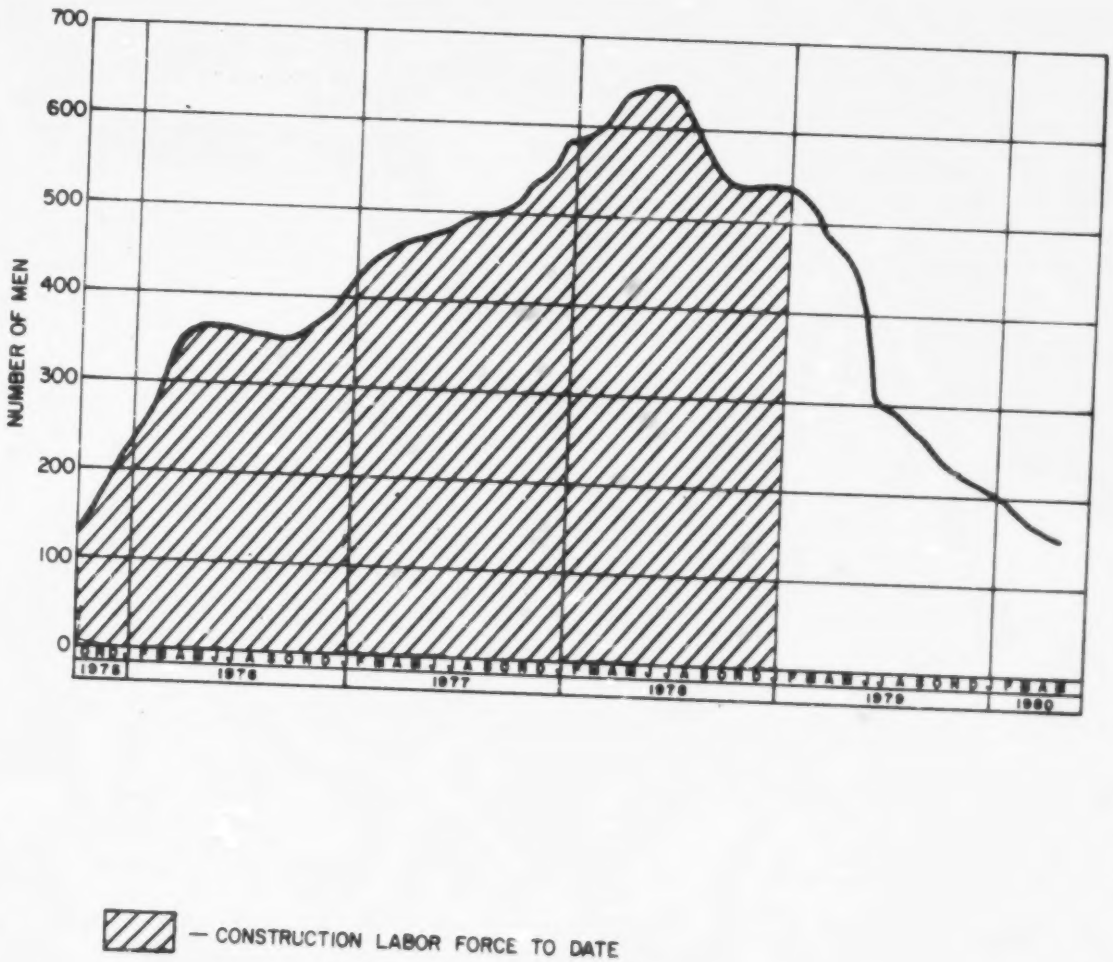
4.5.2 Construction Personnel Requirements

Initial manpower projections for construction of the Fayette Power Project indicated that between 130 and 650 workers would be on-site between mid-1975 and mid-1980. However, in an effort to complete Unit 1 on time for trial operation in March 1979, a short-term temporary increase in the labor force to 889 construction workers has occurred. This peak labor force will remain through April 1979, at which time the construction labor force will decline to approximately 300 workers (Figure 6). The number of workers involved in project construction will continue to decline until Unit 2 is completed during Spring 1980. The construction labor force composition has averaged 16% supervisory personnel, 53% skilled labor, and 31% non-skilled labor. The current breakdown of the construction labor force indicates that most of the workers were hired from outside of the project area and that approximately one-half of these workers have relocated within a 30 mile radius of the project site.

4.5.3 Construction Materials Requirements

Most of the components necessary for plant construction have been acquired from outside of the local project area. This includes the major components of the power generation units, the water systems, and the pollution abatement systems. However, a portion of the construction equipment, fuel, and construction materials required for site preparation, foundations, roadway construction, and other facilities have been procured from local suppliers. Although these purchases represent a relatively small portion of total project construction costs, they do represent a sizable increase (estimated at $2.0 million) in local spending.

Figure 6. Construction manpower projections for the Fayette Power Project (LCRA 1978a).



4.5.4 Plant Construction Costs

It is estimated that construction and other capital investment requirements for the Fayette Power Project will amount to approximately $454 million. This figure includes all power generation, coal handling, and administrative facilities but does not include the cost of transmission lines, the switchyard, or the coal cars. Construction labor costs, as indicated in Table 6, represent nearly $31 million or 5.8% of total construction costs.

Table 6. Fayette Power Project average monthly construction payroll (thousands of dollars).

	1975	1976	1977	1978	1979	1980
Jan.	0	413.7	533.7	765.8	706.2	266.0
Feb.	0	438.3	586.3	770.6	694.6	252.3
Mar.	0	514.3	605.6	803.4	621.8	224.5
Apr.	0	525.8	608.8	843.4	613.2	216.9
May	0	529.4	619.4	851.1	565.0	210.9
Jun.	54.7	530.9	623.3	856.4	404.1	0
Jul.	109.3	505.4	653.2	803.4	384.8	0
Aug.	164.0	489.4	653.2	752.8	373.5	0
Sep.	187.9	477.0	653.2	699.3	342.8	0
Oct.	213.5	469.3	662.4	702.3	307.4	0
Nov.	325.6	502.8	696.1	706.2	293.7	0
Dec.	375.0	525.1	709.2	710.0	279.9	0
TOTAL	$1,430.0	$5,921.4	$7,604.4	$9,264.7	$5,587.0	$1,170.6

SOURCE: Lower Colorado River Authority. 1978. Environmental assessment of the Fayette Power Project. Volume 1. Austin TX. p. 4-18.

4.5.5 Plant Construction to Date

Construction of the Fayette Power Project commenced in mid-1975. Major progress has been made since that time toward meeting the 1979 (Unit 1) and 1980 (Unit 2) operation dates. The current status of these construction activities as of 1 December 1978 is discussed in the following sections. This information has been provided by the staff of LCRA (By letter, John Babcock, 19 October 1978).

4.5.5.1 Cedar Creek Cooling Pond

Construction of the earthen dam across Cedar Creek and other structures is complete and the cooling pond is 100% full. The river pumping station and delivery pipeline are also complete.

4.5.5.2 Unit 1

Overall construction of Unit 1 and common facilities is now 75% complete. Site preparation and excavation is essentially complete with work continuing on the administration building area and parking lot. Plant road work has been roughed in. To date 350,751 cubic yards have been excavated. Concrete placement is 94% complete with formwork, rebar, and foundation work continuing at the coal reclaim area, ash pipe supports, turbine area, and miscellaneous slabs and duct supports. A total of 82,010 cubic yards of concrete have been placed. Structural steel erection is 95% complete with work on stairs, handrails, grating, decking and yard structures continuing. Total steel erected to date is 12,815 tons. Piping erection is 83% complete. Main steam and reheat piping are complete into the turbine. Extraction steam, condensate, and main cooling water are 95% complete. Installation of 2-inch piping, auxiliary steam, and the ash handling system piping continues. Start-up and test activities have begun. Steam generator installation is 78% complete, with the installation of boiler ductwork continuing. The turbine-generator is progressing towards oil flush and is 80% complete at this time. The coal handling system which is common to both units is approximately 80% complete. The electrostatic precipitator is 60% complete with internal work (collector plates, wires and hot roof work) continuing. Installation of other items associated with the above systems includes electrical components (67% complete); mechanical equipment including pumps, tanks and pressure vessels (80% complete); and architectural and pressure vessels (85% complete). Instrumentation and control installation is approximately 75% complete.

4.5.5.3 Unit 2

Overall construction of Unit 2 is now 11% complete. Site preparation is continuing and a total of 76,269 cubic yards have been excavated. Concrete

placement is 50% complete with work on the turbine pedestal legs nearing completion. Total concrete in place is now 20,756 cubic yards. Structural steel is approximately 29% complete. Boiler steel erection and bolt-up is proceeding. Approximately 5,800 tons of structural steel have now been erected. System piping is now 8% complete. Circulating water piping is essentially finished and critical piping continues in the boiler area. The steam generator is now 7% complete. Unloading and storage continues, and boiler erection has begun on an accelerated work schedule. Work has not yet begun on the turbine-generator installation or electrostatic precipitator assembly or installation of associated systems. The coal handling system for Unit 2 is now 8% complete. Erection of coal piping from the bowl mills to the pulverizers is proceeding. The electrical system is 1% complete, with the installation of Unit 2 grounding continuing.

4.5.5.4 Transmission Lines

The transmission line to Austrop is in the initial stages of construction and is scheduled for completion by 1 May 1979. The other transmission lines are scheduled for completion by 1 March 1979 and construction is currently proceeding on schedule.

4.5.6 Construction Impacts To Date

LCRA commenced construction on the Fayette Power Project during 1975 in order to meet the scheduled operating date for Unit 1 of June 1979. Through communications with USEPA, LCRA was advised that construction would proceed at their own risk until the NEPA review process was completed. With this understanding, LCRA has undertaken construction on Units 1 and 2 to the levels indicated in Section 4.5.5. The impacts to date of these construction activities are summarized below.

4.5.6.1 Geologic Impacts

Approximately 3,000 acres of land have been altered in site preparation, power plant construction, cooling pond construction and filling, and trans-

mission line construction. Clearing and grading activities have altered much of the site by removing vegetation and changing natural drainage patterns. Some minimal erosion has occurred, but the extent has been controlled by mitigative actions such as erosion, stormwater, and sediment control structures, seasonal timing of clearing and grading activities to coincide with low rainfall periods, and segmentation of clearing and grading to permit stabilization of work areas. The construction of the makeup intake structure was performed during periods of low flow to minimize bank erosion, sedimentation, and silting.

4.5.6.2 Hydrologic Impacts

The withdrawal of water from the Colorado River to fill the cooling pond has not adversely affected the flows in the River. The impoundment of Cedar Creek and filling of the cooling pond has, however, changed it from a running water system to a standing water system upstream of the dam. The water quality in both the cooling pond and the downstream portion of Cedar Creek has remained similar to pre-project conditions. During construction, some minimal short-term increases in erosion and sedimentation into these water bodies occurred. However, the rainfall runoff was controlled and treated as necessary to meet the requirements of local, State, and Federal regulations.

The cooling pond has also had an impact on the groundwater in the project area. Previously, Cedar Creek had been a discharge source for the shallow sand aquifers. However, when the pond was created, the hydraulic pressure caused the pond to become a recharge area. Thus, the piezometric head of the shallow aquifers was increased to levels approximately equal to the reservoir level. The influence that the reservoir has had on the direction of groundwater flow has not yet been determined. Water quality monitoring data for two existing wells on the project site and the cooling pond indicate total dissolved solids levels of approximately 1,000 to 1,200 mg/l for the wells and 300 to 350 mg/l for the cooling pond. Based on these observations, it appears that the conversion of Cedar Creek from a discharge to a recharge area has not affected groundwater quality to date.

4.5.6.3 Air Quality Impacts

The principal sources of air pollution impacts during site preparation and construction have been fugitive dust, exhaust emissions from construction equipment including clearing devices, hauling vehicles, and other power equipment, and smoke from on-site open burning of refuse and construction wastes. The impacts of these emissions have been localized, and ambient pollutant concentrations significantly above background levels have been of short duration. To minimize the potential impacts of construction activities on air quality, roadways were watered to control dust due to traffic and wind, fuel burning equipment and construction vehicles were maintained in good mechanical order to avoid excessive exhaust emissions, and open burning was located and conducted so as not to create a nuisance.

4.5.6.4 Sound Quality Impacts

The noise levels during construction were calculated by determining the equipment at the site for the different phases of construction in terms of:

- The number of equipment types typically present at the site;
- The duty cycle of each type of equipment (usage factor);
- The average noise level of each equipment type during the construction activity operation.

The USEPA (1975) defines typical equipment and usage factors in industrial construction. Based on these data, the equivalent sound level (L_{eq}) was calculated to be 88 dBA for all of the construction phases (Table 7). The calculation assumes the construction site is a complex source in which equipment is centered at a point 50 feet from an observer.

Table 7. Estimated construction noise on the Fayette Power Project Site.

Equipment		Construction Phase: Clearing	Excavation	Foundation	Erection	Finishing	L_{eq} (50 ft) during work periods for each item, over one project
Air compressor	(81)*	-	1.0	0.4	0.4	0.4	78.0
Backhoe	(85)	0.04	0.16	0.4	-	0.04	76.5
Concrete mixer	(85)	-	-	0.4	0.16	0.16	77.5

Table 7. Estimated construction noise on the Fayette Power Project Site. (cont.)

Equipment		Clearing	Excavation	Foundation	Erection	Finishing	L_{eq} (50 ft) during work periods for each item, over one project
Concrete pump	(82)	-	-	0.05	0.16	0.08	71.0
Concrete vibrator	(76)	-	-	0.2	0.1	0.04	65.5
Crane, derrick	(88)	-	-	-	0.04	0.02	70.0
Crane, mobile	(83)	-	-	-	0.08	0.04	68.0
Dozer	(87)	0.2	0.4	-	-	0.04	77.5
Generator	(78)	0.4	0.4	-	-	-	68.5
Grader	(85)	0.05	-	-	-	0.02	62.5
Paving breaker	(88)	-	0.1	0.04	0.04	0.04	75.0
Loader	(84)	0.16	0.4	-	-	0.04	74.5
Paver	(89)	-	-	-	-	0.12	70.5
Pile driver	(101)	-	-	0.04	-	-	81.0
Pneumatic tool	(85)	-	-	0.04	0.1 [3] **	0.04	76.0
Pump	(76)	-	0.4	1.0 [2]	0.4	-	53.0
Rock drill	(98)	-	0.02	-	-	0.003	75.0
Roller	(80)	-	-	-	-	0.1	60.5
Saw	(78)	-	-	0.04 [2]	0.1 [2]	-	67.5
Scraper	(88)	0.14	-	-	-	0.08	70.5
Shovel	(82)	-	0.4	-	-	0.06	72.0
Truck	(88)	0.16 [2]	0.26 [2]	-	-	0.16	78.5
					L_{eq} (50 ft) per site during work periods =		88.0 dBA

* Numbers in parentheses ( ) represent average noise levels (dBA) at 50 ft.

** Numbers in brackets [ ] represent average number of items in use, if that number is greater than one. Blanks indicate zero or very rare usage.

SOURCE: U.S. Environmental Protection Agency. 1975. Background document for portable air compressors. 550/9-76-004. Washington DC.

The construction noise levels (L_{eq}) were converted to a day/night sound level (L_{dn}) by combining the construction noise levels of a 20-hour work day with the measured pre-construction ambient sound levels (Table 8). The results indicated no increase in day/night sound level (L_{dn}) at the residences nearest to the project site. The estimated construction noise level at the point of closest public approach increased the ambient sound level by 4 dB. This increase in sound level is barely noticeable and has had no impact on land use. The noise impacts due to transmission line construction were minimal due to the short term nature of the activity. As a result, the construction of the Fayette Power Project did not have a significant noise impact on the adjoining land uses.

Table 8. Construction noise levels (dBA) at the Fayette Power Project Site.

Location	Measured Existing Ambient			Construction Noise	Ambient During Construction		
	L_d [1]	L_n [2]	L_{dn} [3]		L_d	L_n	L_{dn}
1	59	52	60	56	61	56	64
2	62	56	64	35	62	56	64
3	54	50	57	43	54	50	57
4	55	50	58	39	55	50	58
5	69	53	68	41	69	53	68

[1] L_d is the daytime equivalent sound level.

[2] L_n is the nighttime equivalent sound level.

[3] L_{dn} is the day/night sound level.

SOURCE: Lower Colorado River Authority. 1978. Environmental assessment of the Fayette Power Project. Volume 1. Austin TX. p. 3-51.

4.5.6.5 Biological Impacts

The construction of the cooling pond has substituted a large standing water impoundment for grassland, forest, and intermittent stream habitats and their associated potentials for biological productivity and species diversity. Approximately 97% of the project site supported some type of vegetation prior to construction, most of which has been eliminated along with the animal communities it supported. However, no threatened or endangered species were found on the plant site, and as a result the removal of existing vegetation types has not significantly affected habitat or species diversity.

Existing and future terrestrial biological productivity has been replaced by increased aquatic biological productivity in the cooling pond. Upon impoundment, major physical, chemical, and biological changes occurred as the aquatic habitat in Cedar Creek changed from a running water (lotic) to a standing water (lentic) environment and as existing standing water bodies (ponds) were flooded. Leaching of inundated soils and vegetation have produced nutrient-rich water almost immediately after filling. As a result of this, biological productivity in the newly impounded pond is greater than in most natural lakes.

4.5.6.6 Archaeologic and Historic Impacts

Of the 18 historic and 31 prehistoric sites identified on the Fayette Power Project site, six prehistoric and three historic sites were investigated and reported on by the Texas Archaeological Survey. Construction activities necessitated the removal of three historic sites from the project site. These sites (Biegel-December House, Legler Log Cabin, and Gentner-Kroll-Polasek Farmstead) were relocated intact to several other locations in Texas. The actions completed by LCRA in coordination with the State have obtained as much information as feasibly possible and have adequately mitigated any adverse impacts. However, historic evidence on some of the less important sites was presumably lost during construction.

4.5.6.7 Socioeconomic Impacts

The construction of the project has permanently converted 3,000 acres of pasture and agricultural land to an industrial use. Approximately 700 acres of this land were classified as prime farmlands, and although only a small portion of this land was cultivated, it will be irretrievably lost for this purpose. However, the formation of a 2,400 acre cooling pond has provided the area with a much needed recreational area. The removal of the project site and an additional 4,500 acres from the tax rolls has resulted in a tax loss of $3,400 in annual County property taxes and $10,500 in annual school taxes. This tax loss will be offset by increased sales tax revenues resulting from the sale of electric power.

The labor force associated with plant construction has reached a maximum level of approximately 889 workers which will decline to approximately 300 workers during April - May 1979 when Unit 1 is completed. Thus far, no major impacts on housing, community facilities and services, or transportation have resulted from the increased project area population (600-800 people). The induced secondary employment (400 jobs) resulting from plant construction in conjunction with construction employment has increased local spending with resultant multiplier effects in the local and regional economies.

The construction of the cooling pond also necessitated the relocation of 5.5 miles of Highway 159 which was successfully completed without the relocation or destruction of any residences. This highway construction was paid for by LCRA and carried out by the Texas Highway Department in accordance with appropriate State environmental regulations.

4.5.6.8 Transmission Line Impacts

The construction of the transmission line corridors is in the initial stages. Clearing and construction activities undertaken thus far have altered natural drainage patterns and have minimally increased erosion. Faunal habitats have been disturbed and some loss of plant and animal species is likely. Revegetation measures are being applied to the corridors upon com-

pletion of construction activities. This will minimize long-term effects and ultimately will increase habitat diversity.

4.6 POWER PLANT OPERATION

4.6.1 Personnel Requirements

Operational staffing for the plant has begun during 1978 and primarily consists of supervisory personnel. Upon completion of both units, it is estimated that 230 operating personnel will be on-site by 1980. The staff breakdown is indicated in Table 9. Based on the current residence patterns of on-site operating personnel, it is anticipated that nearly all operating personnel will reside within the 30 mile project area.

Table 9. Plant operation staffing requirements, Fayette Power Project, Units 1 and 2.

General Category	Personnel Required
Supervisors	38
Operators	40
Coal Handlers	28
Clerical	17
Mechanical Maintenance	49
Electrical Maintenance	22
Instrument Maintenance	9
General Maintenance	19
Lab Technicians	8
Total	230

SOURCE: Lower Colorado River Authority. 1978. Environmental assessment of the Fayette Power Project. Volume 2. Austin TX. p. C-54.

4.6.2 Plant Output

If plant construction remains on schedule, Unit 1 is projected to be operational by June 1979. During 1979, Unit 1 will generate an estimated 2.4 billion kilowatt hours (kwh) which will increase to 2.9 billion kwh per year in 1980 and throughout the life of the project. Unit 2 will come on-line during June 1980 and will generate 2.5 billion kwh during 1980 and 3.0 billion kwh per year from 1981 through the project life (2010). Based on these estimates, total project output will be 2.4 billion kwh in 1979, 5.4 billion kwh during 1980, and 5.9 billion kwh from 1981 through 2010. These figures assume an average load factor of 70% and include transmission and distribution losses.

4.6.3 Operating Revenues and Expenses

The average revenue per kilowatt hour sold for Unit 1 is estimated to be $.0415 (in 1979 dollars) and for Unit 2, the estimate per kilowatt hour sold is $.0396 (in 1980 dollars). Based on the annual projected output of Unit 1 (2.9 billion kwh) and Unit 2 (3.0 billion kwh), the estimated annual revenues from plant operation will be $120,350,000 for Unit 1 and $118,800,000 for Unit 2.

In comparison, the estimated annual operating costs for Units 1 and 2 will be $44.8 million and $62.1 million respectively as indicated in Table 10. The major component of the operating and maintenance costs over the 30 year economic life of the project is fuel costs, estimated at approximately $40.7 and $59.5 million respectively for Units 1 and 2.

This estimate is based on usage and price levels during the initial year of operation for each unit using a 70% annual load factor. These estimates do not include the annual write-off of capital costs for the project, however. Based on these figures, the average operating cost per kilowatt hour is $.015 for Unit 1 and $.021 for Unit 2.

Table 10. Annual operating and maintenance costs[1] by unit, Fayette Power Project (1979-2010).

	Unit 1 (1979-2009)	Unit 2 (1980-2010)
Fuel Cost	$40,700,000	$59,500,000
All Other Operating & Maintenance Costs[2]	$ 4,100,000	$ 2,600,000
Total	$44,800,000	$62,100,000

[1] Based on 1979 dollars for Unit 1 and 1980 dollars for Unit 2.

[2] These costs include labor, maintenance, insurance, and other miscellaneous operating and maintenance costs.

SOURCE: Lower Colorado River Authority. 1978. Environmental assessment of the Fayette Power Project. Volume 2. Austin TX. p. C-59.

5.0 IMPACTS OF THE PROJECT ON THE ENVIRONMENT

This section discusses the existing environmental setting and the impacts which will result from project operation. Construction impacts, which in large measure have occurred already, have been addressed previously in Section 4.5.6 and are included as part of the existing setting where appropriate.

5.1 GEOLOGY

5.1.1 Topography

The Fayette Power Project site is located in east-central Texas on a topographic ridge that is bounded by Cedar Creek to the east and Baylor Creek to the west (Figure 7). The project site lies in the south-central portion of the west Gulf Coastal Plain where the topography consists of rolling to hilly uplands with flat floodplains along the major streams. Elevations range from 265 feet above sea level in the southwest corner of the site to over 425 feet in the northern areas of the site.

5.1.2 Surface and Subsurface Geology

The site of the Fayette Power Project lies within the Oakville geologic formation. Because it is difficult to distinguish between the Oakville and Lagarto formations, they are considered as a single unit. The stratigraphy of the geologic formations found in Fayette County is presented in Table 11. These geologic rock formations range from the Midway Group of Paleocene Age, which lies at a depth of from 3,800 to 9,000 feet below Fayette County, to the alluvial deposits of Quaternary Age.

Table 11. General stratigraphic column of geologic formations in Fayette County.

Geologic Formations	Thickness (ft.)
Jackson Group	
Alluvium	0 - 60
Oakville sandstone and Lagarto clay	0 - 950
Catahoula tuff	0 - 500
Frio clay	0 - 520

Table 11. General stratigraphic column of geologic formations in Fayette County. (cont.)

Geologic Formations	Thickness (ft.)
Claiborne Group	
Yegua formation	600 - 1,000
Cook Mountain formation	0 - 500
Sparta sand	0 - 275(avg. 150)
Wenches greensand	75 - 150
Queen City sand	480 - 750
Reklaw formation	225 - 400
Carrizo sand	200 - 300
Wilcox Group (clays, silts, sands and sandstones, sandy shales, and thinly bedded lignite)	2,400 - 3,800
Midway Group (shales and clays with lenticular sands)	900 - 950

SOURCE: Lower Colorado River Authority. 1978. Environmental assessment of the Fayette Power Project. Volume 1. Austin TX. p. 3-7.

The Mexia-Luling-Talco fault system interrupts these geologic formations, but is not generally considered earthquake producing. No faulting has been noted within the Fayette Power Project site, although past faulting of less than 50 feet accumulated offset is possible. If one of these faults lies within the reservoir, it could increase seepage. However, a subsurface investigation of the Fayette Power Project site by National Soil Service, Inc. (NSS), suggests that the geological properties of the site are favorable for construction of the plant. Data obtained by NSS, in conjunction with other water well data, suggest that the total reservoir ground seepage should be approximately 100 gpm.

5.1.3 Soil Characteristics

The Fayette Power Project lies in a soil region that is generally classified as a Burleson-Heiden-Crockett Association. This association consists of deep to shallow calcareous clays that are characteristic of the

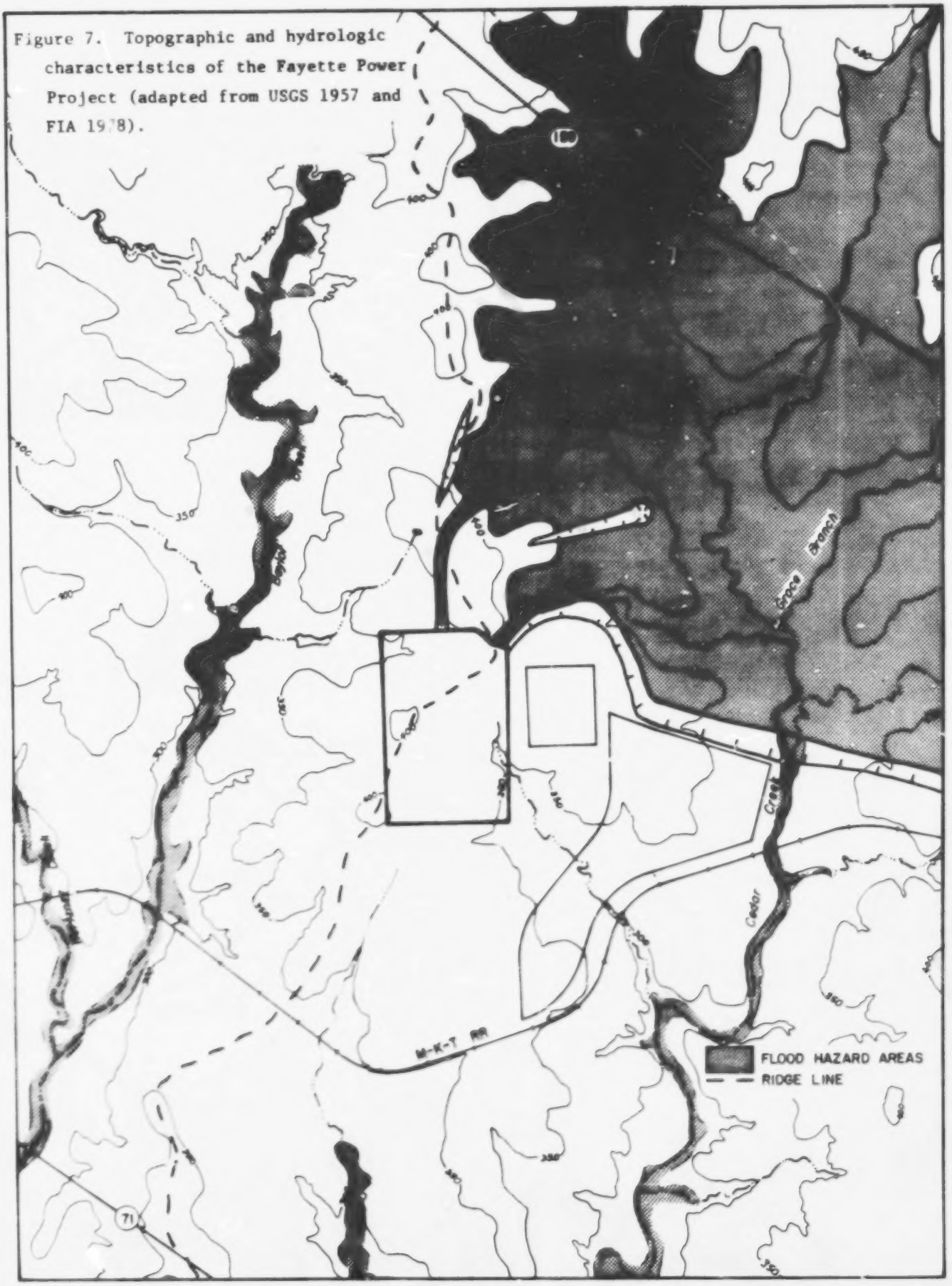


Figure 7. Topographic and hydrologic characteristics of the Fayette Power Project (adapted from USGS 1957 and FIA 1978).

Blackland Prairie (Godfrey 1973). In addition to these prairie clays, the Fayette Power Project site also consists of sandy, loamy soils over clay while the lower portion of the site lies in the Colorado River floodplain which is composed of soils with loamy surface layers and clayey or loamy subsoils.

The U.S. Soil Conservation Service (SCS) conducted a detailed survey of the soil associations located on the project site and determined the approximate percentages of the major soil types in the upper and lower portions of the site (Figure 8). In general, prairie soils (mainly the Heiden Series) dominate the northwest portion of the site. The soils are firm, deep calcareous clays which are well-drained and have a slow permeability. The remainder of the upper portion of the site (north of the MKT Railroad) is sandy or loamy sand dominated by the Crockett Series. These soils generally have friable, massive, fine sandy loam surface layers over a firm clay subsoil. They are moderately well-drained and have a very slowly permeable subsoil with a high shrink-swell potential. Between the railroad and U.S. Highway 71, soils are sandy or gravelly. They are well drained with moderately permeable lower layers that have high shrink-swell potentials. Below the railroad along Cedar Creek and extending into the broad floodplain of the Colorado River, soils are silty clay loams that are moderately well-drained with a very slow permeability.

5.1.4 Impacts on Geology

Once project construction has been completed, there will be very little impact on the geology of the site during the operation of the power plant. However, modification of the topography during construction is unavoidable and, although partial restoration of the project site is planned, duplication of pre-project topography will not be possible. Major excavations and parts or all of some structures will remain permanently. Although aesthetics of the area will be altered with construction, the cooling pond will offer some scenic attraction and will help to mitigate adverse aesthetic effects.

5.2 HYDROLOGY

5.2.1 Water Resources

5.2.1.1 Cedar Creek

The Fayette Power Project is bordered on the east by Cedar Creek and on the west by Baylor Creek, both of which are tributary to the Colorado River. Cedar Creek is now impounded by a dam and this impoundment will be used as a cooling pond for the plant when it becomes operational. The drainage area of Cedar Creek at this location was 3,720 acres, but with the construction of the pond it now drains only 1,290 acres. The water volumes discharged into the Colorado River from Cedar Creek prior to impoundment are indicated in Table 12. Prior to its conversion to a standing water body, Cedar Creek was characterized by a meandering channel and small pools (up to eight feet in depth). Cedar Creek had an average daily discharge of 4.45 cfs into the Colorado River and an annual discharge of approximately 3,212 acre-feet.

Table 12. Estimated mean daily and total annual volume of discharge for Cedar Creek.

Water Year	Mean (cfs)	Total (acre-ft.)
1963	0.75	541
1964	0.64	462
1965	3.30	2,287
1966	3.63	2,636
1967	1.10	796
1968	6.54	4,750
1969	6.65	4,820
1970	2.36	1,708
1971	3.58	2,590
1972	6.35	4,610
1973	9.28	6,692
1974	9.20	6,646

SOURCE: Lower Colorado River Authority. 1978. Environmental assessment of the Fayette Power Project. Volume 1. Austin TX. p. 3-12.

5.2.1.2 Groundwater

The Oakville formation is the major geological stratigraphic unit in the project area and groundwater produced from this formation is used for domestic and municipal purposes. At the plant site, groundwater exists under both the artesian and water table conditions. The water table is in the Oakville formation, but clay lenses frequently confine the groundwater to produce an artesian or confined aquifer condition. In some areas, these upper clay layers are overlain by isolated lenses of water-bearing, weathered sandstones to form perched water tables. Isolated portions of alluvial and terrace deposits may also contain groundwater in the site area. The groundwater of Fayette County, which ranges from fresh to slightly saline, is generally of good quality and suitable for most purposes.

5.2.1.3 Other Surface Waters

The Colorado River is located approximately three miles south of the Fayette Power Project. At the site of the intake structure, the Colorado River drains approximately 40,430 square miles and has an average flow of approximately 2,560 cfs. The river has been regulated by the Buchanan Reservoir since 1937. With the construction of Mansfield Dam in 1940 (creating Lake Travis), 38,130 square miles of the River's watershed are controlled. The historical instantaneous discharges for the Colorado River at La Grange, Texas are indicated in Table 13.

The transmission lines from the Fayette Power Project will cross lakes, rivers, or creeks a total of 19 times in Fayette, Bastrop, and Lee Counties. Numerous other small farm ponds existed on the site prior to construction, but have become part of the cooling pond after impoundment. There are no streams in Texas classified as Wild and Scenic Rivers, and there are no historical springs located in the transmission line corridors.

5.2.1.4 Flood Hazard Areas

The 100 year flood plain as defined by the U.S. Department of Housing and Urban Development, Federal Insurance Administration (U.S. DHUD, FIA 1978)

COMPOSITION OF THE FAYETTE POWER PROJECT SITE BY GENERAL SOIL TYPES

Map Codes	General Soil Type	Percent Composition: Cooling Pond, Plant, Dam	Percent Composition: Access Road Pipeline Corridor
23, 28, 30, 35, 36, 46	fine sandy loam	43.2%	17.8%
8, 11, 18, 21	clay	19.0	23.1
3, 19	clay loam	11.9	5.0
33	loamy fine sand	13.5	2.5
9	loam	10.4	2.1
60	sandy clay loam	2.2	-
77	gravelly sandy loam	-	25.6
24, 95, 98, 112, 124	silty clay loam	-	16.1
	gravel bed	-	5.8
113	gravelly clay	-	1.2
143	sandy land	-	.8
		100.2	100.0

Upland Soils
Bottomland Soils
Prime Farmland

Figure 8. Soils characteristics of the Fayette Power Project (adapted from LCRA 1978a and SCS 1978).

Table 13. Historical annual maximum instantaneous discharges for the Colorado River at La Grange, Texas.

Water Year	Date	Stage (ft)	Discharge (cfs)
1869	9 Jul 1869	56.7	--
1914	5 Dec 1913	56.4	--
1935	17 Jun 1935	50.84	255,000
1938	27 Jul 1938	42.95	200,000
1939	17 Jul 1939	10.27	15,900
1940	30 Jun 1940	40.18	182,000
1941	8 Jun 1941	25.6	104,000
1942	5 Jul 1942	18.7	59,200
1943	20 Oct 1942	8.20	11,300
1944	31 Aug 1944	8.36	12,200
1945	19 Jan 1945	12.78	27,800
1946	1 Jun 1946	16.04	34,700
1947	5 Nov 1946	15.70	36,100
1948	27 May 1948	4.50	4,130
1949	26 Apr 1949	20.20	54,400
1950	3 Jun 1950	14.80	26,100
1951	5 Jun 1951	13.02	19,000
1952	28 May 1952	9.07	10,100
1953	29 Apr 1953	18.31	46,800
1954	3 Dec 1954	14.0	24,600
1955	18 May 1955	10.00	12,400
1956	Gauge Discontinued		

SOURCE: Lower Colorado River Authority. 1978. Environmental assessment of the Fayette Power Project. Volume 1. Austin TX. p. 3-14.

is defined in Figure 7. The only portion of the Fayette Power Project other than the cooling pond which lies within the flood plain is the makeup water intake structure.

5.2.2 Water Quality

5.2.2.1 State Classification and Standards

The Fayette Power Project is located in the Colorado River Basin on stream segment number 1402. The Texas Surface Water Quality Standards for this segment are as follows (TDWR 1978):

Chloride	100 mg/l
Sulfate	75 mg/l
Total Dissolved Solids	500 mg/l
Dissolved Oxygen	5 mg/l
pH Range	6.5 - 9.0
Fecal Coliform	200 organisms/100 ml.
Temperature	95 F

The effluent from the Fayette Power Project is subject to USEPA New Source Performance Standard (40 CFR 423) chlorine limitations for the condenser discharge to the cooling pond and to the State standards for the cooling pond discharge to Cedar Creek. A permit from the State for the cooling pond discharge already has been received by LCRA (By letter, John Babcock, 26 October 1978). At the State level, this permit is equivalent to an NPDES permit.

5.2.2.2 Sources of Water Pollution

Table 14 indicates that both the Colorado River and Cedar Creek possess high concentrations of total and fecal coliform. The Colorado River during 1975 had a total coliform count that ranged from 2,200 to 6,267 organisms per 100 ml. and a fecal coliform count of 1,290 to 5,620 organisms per 100 ml. The high ends of these coliform ranges resulted from a sewage treatment plant malfunction in Austin during the sampling period. Normal coliform levels fall at the lower end of this range. Cedar Creek had even higher levels during this period with a total coliform range from 8,887 to 54,500

organisms per 100 ml. and a fecal coliform range of 2,513 to 10,158 organisms per 100 ml. Since there is a low density of human settlement in the area, the source of this pollution is most likely the fecal material from the cattle which graze in the area. There are no other known sources of water pollution in the project vicinity.

Table 14. Water chemistry data for the Fayette Power Project Site, June - August, 1975.

	Cedar Creek			Colorado River		
Parameter (mg/l)*	Sta. 1	Sta. 2	Sta. 3	Sta. 4	Sta. 5	Sta. 6
Biochemical Oxygen Demand	13	12	9	4	4	4
Chemical Oxygen Demand	31	23	13	15	13	15
Total Organic Carbon	18	16	12	12	13	13
Chloride	129	125	72	48	49	47
Silica	24	33	19	10	11	10
Sulfate	66	46	46	34	32	28
Nitrate Nitrogen	.16	.10	.16	.61	.62	.66
Ammonia Nitrogen	.56	.33	.26	.25	.37	.21
Ortho Phosphate Phosphorus	.07	.06	.14	.09	.17	.19
Total Phosphate Phosphorus	.16	.20	.18	.14	.22	.26
Total Dissolved Solids	847	675	388	333	335	317
Alkalinity, Carbonate	0	0	0	5	4	4
Alkalinity, Bicarbonate	252	337	174	163	169	170
Fecal Coliform #/100 ml	10158	2513	8447	5670	1373	1290
Total Coliform #/100	54500	12833	8887	6267	3473	2200
Arsenic	.007	.009	.006	.006	.007	.006
Calcium	157	149	87.4	63.3	66.2	63.3
Mercury	.001	.002	.001	.001	.001	.001
Magnesium	11	8.32	12.69	17.47	16.2	16.63
Sodium	71	90	48.5	29	29	29
Selenium	.007	.006	.007	.005	.006	.005
Barium	.20	.32	.19	.10	.11	.10
Boron	.13	.13	.13	.15	.15	.13
Silver	.02	.02	.02	<.01	.03	<.01
Chromium	.02	.02	.01	.02	.01	.01
Copper	.06	.10	.10	.04	.03	.06
Lead	.14	.05	.01	.02	.01	.01
Manganese	.47	1.03	.05	.05	.10	.05
Nickel	.14	.04	.03	.01	.14	.05
Zinc	.02	.01	.02	.02	.02	.02
Cadmium	<.01	<.01	<.01	<.01	<.01	<.01
Iron**	2.12	1.60	1.03	1.40	1.55	1.95
Aluminum	13	7	12	10	11	8
Temperature (^{o}C)	33	30.8	31.5	29.6	29.7	29
Dissolved Oxygen	9.1	7.2	8.7	7.5	7.5	7.9
pH (units)***	7.1	7.4	7.2	7.1	7.2	7.1
Turbidity (JTU)***	30	25	76	41	38	36
Current Velocity (m/sec)****	0	.1	-	1.5	.1	1.1

Table 14. Water chemistry data for the Fayette Power Project Site, June - August, 1975. (cont.)

Parameter (mg/l)*	Cedar Creek Sta. 1	Cedar Creek Sta. 2	Cedar Creek Sta. 3	Colorado River Sta. 4	Colorado River Sta. 5	Colorado River Sta. 6
Pesticides (mg/l)						
Lindane	< .10	< .10	< .10	< .10	< .10	< .10
Malathion	26.8	7.5	40	16.1	17.3	18.4
Heptachlor***	4.17	N.D.	.17	N.D.	.06	.09
Dieldrin***	1.71	<5	<5	<5	<5	<5
Aldrin***	.14	N.D.	N.D.	N.D.	N.D.	N.D.
DDT***	50	N.D.	55	.08	N.D.	33.8
Zolone***	N.D.	65	N.D.	N.D.	N.D.	N.D.
2,4-D ethanol ester butoxy***	.41	.30	.16	.26	.31	.53
2,4-D Isopropyl ester***	2.7	1.2	N.D.	.70	1.85	.76
2,4-D Buytyl ester***	54.8	3.5	85	5.4	15	38.8

N.D. Not Detected
* Unless otherwise noted analyzed by Southwestern Labs., Houston
** June & August only
*** July, August only
**** June only

SOURCE: Lower Colorado River Authority. 1978. Environmental assessment of the Fayette Power Project. Volume 1. Austin TX. pp. 3-23 - 3-28.

5.2.2.3 Surface Waters

The U.S.G.S. maintains water quality and streamflow monitoring stations on the Colorado River. The information obtained from the Columbus and Wharton stations represents the water quality of the Colorado River in the vicinity of the Fayette site. The Columbus gage (08161000) is located about 30 miles downstream from the proposed intake structure and the Wharton gage (08162000) is approximately 68.5 miles downstream from Columbus.

The Colorado River water quality data obtained from the Columbus gage (1967-1973) indicate that the water quality is within the limits set by the TWDR (1978), with the exception of one high pH measurement (Table 15). The data from the Columbus gage also indicate that the Colorado River has a daily mean suspended sediment concentration of 348 mg/l.

Table 15. Historical water quality of the Colorado River in the vicinity of the Fayette Power Project Site, Columbus, Texas.

Water Chemistry (USGS Station 08161000, Columbus, Texas 1967-1973)			
Parameter**	No. of Obs.	Average	Maximum
Silica, SiO_2	47	7.8	33.
Calcium, Ca	47	50.7	72.
Magnesium, Mg	47	17.3	24.
Bicarbonate, HCO_3	54	183.3	284.
Carbonate, CO_3	54	0.39	8.
Sulfate, SO_4	47	37.	62.
Chloride, Cl	54	48.	68.
Fluoride, F	47	0.23	0.5
Organic Nitrogen, N	6	0.16	0.35
Nitrite, N	23	0.02	0.09
Ammonia Nitrogen, N	23	0.10	0.26
Nitrate, N*	64	0.41	3.1
Phosphorus, P*	37	0.24	1.79
Total Dissolved Solids	43	290.	370.
Hardness, Ca, Mg	54	193.	260.
Non Carb. Hardness	54	42.	60.
Sodium Absorption Ratio	45	1.	1.4
Specific Conductance (µmhos)	70	506.	702.
pH (units)	70	7.7	8.8
Dissolved Oxygen	35	9.2	12.8
Percent Saturation (%)	35	102.	120.
BOD	37	2.5	8.2

*Prior to the 1970 water year, nitrate and phosphorus concentrations were reported as NO_3 and PO_4, respectively. These values have been converted to the appropriate nitrogen and phosphorus levels.

**mg/l unless otherwise indicated.

SOURCE: Lower Colorado River Authority. 1978. Environmental assessment of the Fayette Power Project. Volume 1. Austin TX. p. 3-18.

Trace metal and temperature measurements were obtained from the Wharton gage. The trace metal concentrations (Table 16) comply with the Environmental Protection Agency Proposed Water Quality Criteria (USEPA 1973c) and with TWQB Order No. 70-0828-5. Historical temperature data for the Colorado River were also within the limits set by the TDWR (Table 17).

From June through August 1975, LCRA analyzed various water quality parameters, including those for concentrations of heavy metals and pesticides, for the Colorado River and Cedar Creek at six sampling locations (Figure 9). The results from this summer 1975 study indicate that the values recorded for the Colorado River were generally in agreement with the historical results described previously (Table 14). The values obtained for Cedar Creek were similar to those recorded for the Colorado River. However, as previously noted, the fecal coliform counts exceeded the Texas Surface Water Quality Standards for both Cedar Creek and the Colorado River.

Recent water quality data for Cedar Creek (sampled at the plant discharge canal), obtained from August 1977 through July 1978, indicate that the Creek's water quality remains in compliance with the Texas Surface Water Quality Standards (Table 18). Water quality monitoring also has been performed by LCRA in the cooling pond since the initial stages of water intake. As of August 1978, the water quality in the pond has remained similar to Cedar Creek's and in compliance with the State standards (Table 19).

The average total dissolved solids concentration in the cooling pond is 334 mg/l and is not expected to exceed 1100 mg/l after plant operation begins. The temperature of the cooling pond discharge is not expected to exceed 95 F.

5.2.2.4 Groundwater

In Fayette County, the quality of groundwater tends to degrade with increased downdip distance from the respective geologic formation outcrops. In wells of 500 feet deep or greater, the groundwater usually contains from 1,000 to 3,000 ppm of total dissolved solids which is substantially higher

Table 16. Historical water quality of the Colorado River in the vicinity of the Fayette Power Project Site, Wharton, Texas.

Dissolved Trace Metals (USGS Station 08162000, Wharton, Texas 1968-1973)			
Parameter	No. of Obs.	Maximum	
Aluminum, Al	12	150.	mg/l
Arsenic, As	12	10.	
Cadmium, Cd	12	2.	
Chromium, Cr	12	0.	
Cobalt, Co	12	2.	
Copper, Cu	14	8.	
Iron, Fe	13	100.	
Lead, Pb	14	40.	
Lithium, Li	12	20.	
Manganese, Mn	11	20.	
Mercury, Hg	8	2.7	
Nickel, Ni	12	7.	
Strontium, Sr	14	590.	
Zinc, Zn	13	80.	

SOURCE: Lower Colorado River Authority. 1978. Environmental assessment of the Fayette Power Project. Volume 1. Austin TX. p. 3-19.

Table 17. Historical temperature data for the Colorado River in the vicinity of the Fayette Power Project Site, (USGS Station 08162000, Wharton, Texas 1945-1973).

	TEMPERATURE (^{o}F)		
	Mean	Maximum	Minimum
Jan	53	71	35
Feb	58	71	42
Mar	64	89	45
Apr	71	88	56
May	77	90	64
Jun	82	93	72
Jul	84	95	75
Aug	84	92	76
Sep	81	90	69
Oct	73	89	59
Nov	63	79	45
Dec	56	71	35

SOURCE: Lower Colorado River Authority. 1978. Environmental assessment of the Fayette Power Project. Volume 1. Austin, TX. p. 3-21.

TABLE OF CONTENTS

	Page	
EXECUTIVE SUMMARY	i	1/A6
TABLE OF CONTENTS	vii	1/A12
LIST OF TABLES	x	1/B1
LIST OF FIGURES	xii	1/B3
1.0 INTRODUCTION	1	1/B4
2.0 NEED FOR THE PROJECT	2	1/B5
2.1 NATIONAL ENERGY TRENDS	2	1/B5
2.2 STATE AND REGIONAL ELECTRIC UTILITY TRENDS	3	1/B6
2.3 APPLICANT'S NEED FOR THE PROJECT	5	1/B8
3.0 ALTERNATIVES	6	1/B9
3.1 ALTERNATIVES CONSIDERED BY THE APPLICANT	6	1/B9
3.1.1 No Action	6	1/B9
3.1.2 Purchase or Exchange of Power	6	1/B9
3.1.3 Reactivation or Upgrading of Existing Units	7	1/B10
3.1.4 Conversion of Peaking Units	7	1/B10
3.1.5 Voluntary Consumer Conservation	7	1/B10
3.1.6 Construction of New Power Source	8	1/B11
3.1.7 Selected Alternative	13	1/C6
3.2 ALTERNATIVES AVAILABLE TO USEPA	13	1/C6
3.2.1 Issuance of the Permit	13	1/C6
3.2.2 Denial of the Permit	14	1/C7
3.3 ALTERNATIVES AVAILABLE TO OTHER PERMITTING AGENCIES	14	1/C7
3.4 IMPACTS OF THE APPLICANT'S ALTERNATIVES	15	1/C8
3.4.1 No Action Alternative Impacts	15	1/C8
3.4.2 Impacts of Selected Alternative	20	1/C13
4.0 DESCRIPTION OF THE PROJECT	27	1/D6
4.1 PROJECT LOCATION AND SITE CHARACTERISTICS	27	1/D6
4.2 POWER PLANT DESCRIPTION	28	1/D10
4.2.1 Power Generation Facilities	28	1/D10
4.2.2 Fuel Requirements	28	1/D10
4.2.3 Cooling Pond and Makeup Water System	30	1/E1
4.2.4 Circulating Water System	31	1/E2
4.2.5 Miscellaneous Water Systems	32	1/E3
4.2.6 Auxiliary Facilities	33	1/E4
4.3 POLLUTION CONTROL MEASURES	33	1/E4
4.3.1 Air Pollution Control	33	1/E4
4.3.2 Wastewater Treatment	35	1/E6
4.3.3 Solid Waste Disposal	37	1/E8
4.3.4 Noise Abatement	37	1/E8
4.4 TRANSMISSION LINES	39	1/E10

TABLE OF CONTENTS (Cont.)

	Page	
4.5 POWER PLANT CONSTRUCTION	40	1/E13
4.5.1 Construction Schedule	40	1/E13
4.5.2 Construction Personnel Requirements	41	1/E14
4.5.3 Construction Materials Requirements	41	1/E14
4.5.4 Plant Construction Costs	42	1/F2
4.5.5 Plant Construction to Date	42	1/F2
4.5.6 Construction Impacts to Date	44	1/F4
4.6 POWER PLANT OPERATION	51	1/F11
4.6.1 Personnel Requirements	51	1/F11
4.6.2 Plant Output	52	1/F12
4.6.3 Operating Revenues and Expenses	52	1/F12
5.0 IMPACTS OF THE PROJECT ON THE ENVIRONMENT	54	1/F14
5.1 GEOLOGY	54	1/F14
5.1.1 Topography	54	1/F14
5.1.2 Surface and Subsurface Geology	54	1/F14
5.1.3 Soil Characteristics	55	1/G1
5.1.4 Impacts on Geology	56	1/G3
5.2 HYDROLOGY	57	1/G4
5.2.1 Water Resources	57	1/G4
5.2.2 Water Quality	60	1/G8
5.2.3 Water Supplies and Water Uses	68	2/A7
5.2.4 Impacts on Hydrology	68	2/A7
5.3. AIR QUALITY	72	2/A11
5.3.1 Climatology	72	2/A11
5.3.2 Dispersion Meteorology	72	2/A11
5.3.3 Air Quality	76	2/B6
5.3.4 Prevention of Significant Deterioration	78	2/B8
5.3.5 Impacts on Air Quality	79	2/B9
5.4 SOUND QUALITY	85	2/C3
5.4.1 Existing Conditions	85	2/C3
5.4.2 Impacts on Sound Quality	87	2/C6
5.5 BIOLOGY	88	2/C7
5.5.1 Aquatic Biota	88	2/C7
5.5.2 Landscape Types	92	2/C11
5.5.3 Terrestrial Wildlife	95	2/D2
5.5.4 Endangered and Threatened Species	98	2/D5
5.5.5 Important Biological Resources	100	2/D7
5.5.6 Parks, Preserves, and Wildlife Refuges	100	2/D7
5.5.7 Impacts on Biological Resources	100	2/D7
5.6 ARCHAEOLOGY AND HISTORY	103	2/D10
5.6.1 Archaeological and Historic Resources of the Project Area	103	2/D10
5.6.2 Impacts on Archaeological and Historic Resources	106	2/E1
5.7 SOCIOECONOMICS	108	2/E3
5.7.1 Land Use	108	2/E3
5.7.2 Population Center Characteristics	109	2/E4
5.7.3 Transportation and Traffic	113	2/E10
5.7.4 Impacts on Socioeconomics	113	2/E10

TABLE OF CONTENTS (Cont.)

	Page	
5.8 TRANSMISSION LINES	116	2/E14
5.8.1 Existing Conditions	116	2/E14
5.8.2 Impacts of Transmission Lines	117	2/F1
6.0 COORDINATION	119	2/F3
6.1 PUBLIC PARTICIPATION	119	2/F3
6.2 LCRA PROJECT COORDINATION	119	2/F3
6.3 PERMITS AND APPROVALS	119	2/F3
6.3.1 Other Federal Requirements	120	2/F4
6.3.2 Other State Requirements	120	2/F4
6.4 CORRESPONDENCE	121	2/F5
BIBLIOGRAPHY	128	2/F12
APPENDIX A Draft NPDES Permit	A-1	2/G2
APPENDIX B Biology Supporting Data	B-1	3/A10

Figure 9. Aquatic sampling locations at the Fayette Power Project (LCRA 1978a).

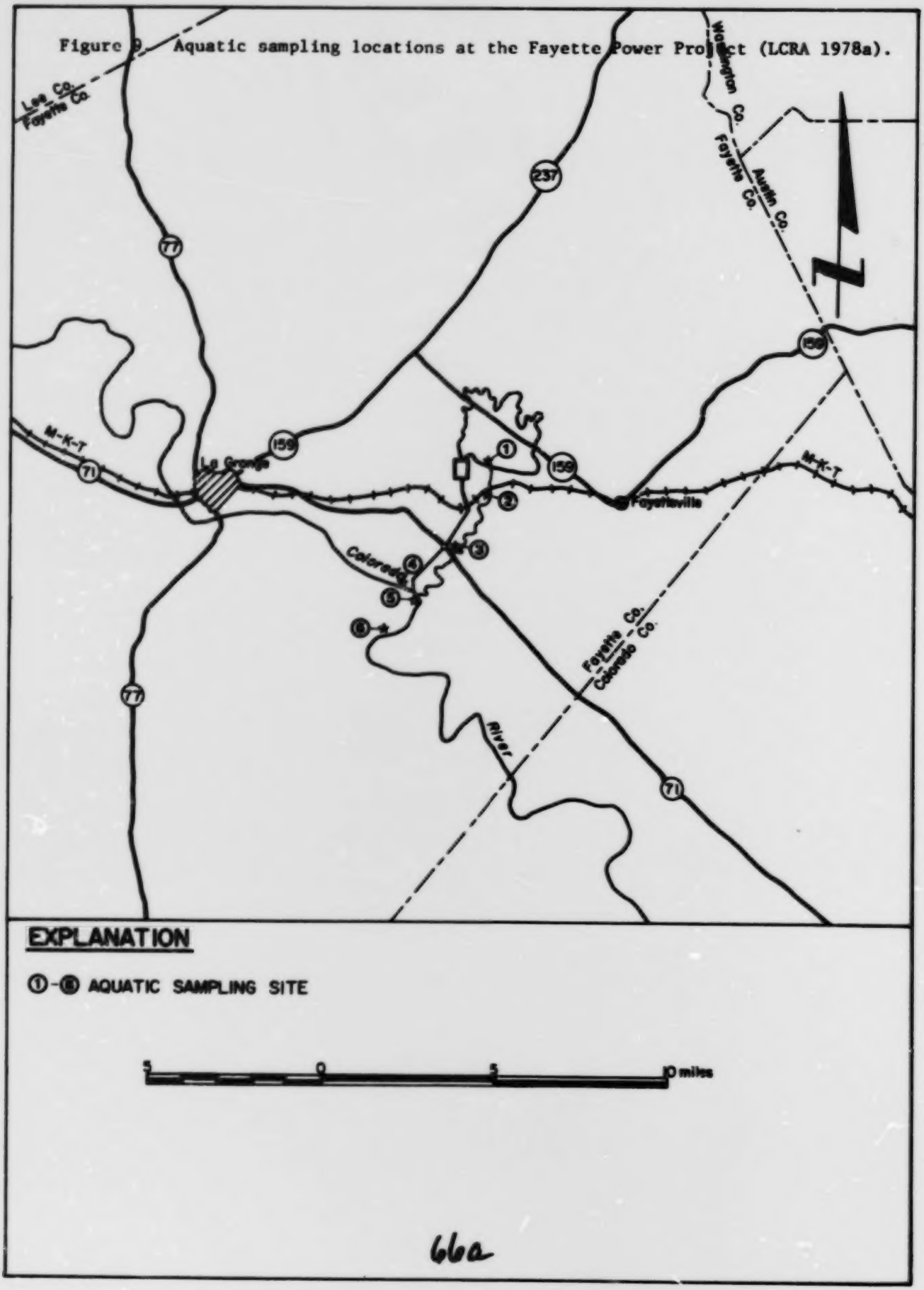


Table 18. Cedar Creek water quality on the Fayette Power Project Site, August 1977 - July 1978.

	pH	(µmhos) Conductivity	Total Hardness	mg/l Calcium	mg/l Magnesium	mg/l Chloride	mg/l CO_3	mg/l HCO_3	mg/l TSS	TDS
Aug. 77	8.34	555	200	56	14.6	61	60	156	27	365
Sept.										
Oct.	8.19	653	294	68	30.1	53.6	10	222	0	330
Nov.	8.3	626	276	73.6	25.8	68	9	210	8	442
Dec.	8.26	577	260	60.8	26.2	69	4	196	11	408
Jan. 78	8.10	550	232	63.2	18.0	62	6	183	32	397
Feb.	8.49	393	208	58.4	15.1	67	10	152	30	386
Mar.	8.52	450	219	72.8	8.75	99	13	167	6	378
April	8.0	513	218	49.6	22.8	72	2	161	-	392
May	8.0	530	192	44	19.9	69	6	146	284	414
June	8.22	583	200	48.8	18.9	-	0	158	107	380
July	8.45	619	214	47.2	23.3	-	4	160	14	365
Average	8.26	550	228	58.4	20.3	70	11	174	43	387
Range	8-8.52	393 - 653	192 - 294	44 - 73.6	8.75 - 30.1	53.6 - 99	0 - 60	146 - 222	0 - 234	330 - 442

SOURCE: Lower Colorado River Authority. 1978. Water analysis, Fayette Power Project, August 1977 - August 1978. Austin TX. 12 p.

than the U.S. Public Health Service's recommended maximum of 500 ppm of total dissolved solids for drinking water. Groundwater from wells less than 500 feet deep generally contain a concentration of dissolved solids less than 1,000 ppm (Table 20). However, two existing wells on the project site located below the dam east of the ash disposal pond had TDS levels during 1978 ranging from 1,346 to 912 mg/1 for Well #1 and 1,594 to 1,016 mg/1 for Well #2. These wells are existing farm wells lying at depths of 120 feet for Well #1 and 126 feet for Well #2. Chlorine levels in the two wells ranged from 80 to 90 mg/1 for Well #1 and 93 to 121 mg/1 for Well #2.

5.2.3 Water Supplies and Water Uses

The cooling pond will provide the water for all plant services. The cooling pond will obtain all of its makeup water from the Colorado River via an intake structure located approximately four miles south of the plant site. The amount of makeup water required is estimated to be 36 cfs or about 26,000 acre-feet per year.

The pond will obtain its makeup water from the Colorado River which has an adequate supply of water. If the plant is expanded to 3,000 MWe, Baylor Creek will be impounded to serve as an additional water supply. The intake structure is capable of providing both fill and makeup water to the pond without disturbing the operation of Units 1 and 2. The quality of the plant's water supply is acceptable and can be adequately treated to suit the various needs of the plant.

Other water uses for the Colorado River and Cedar Creek include contact and non-contact recreation, the propagation of fish and wildlife, and domestic raw water supply (TDWR 1978). The water from the wells in the vicinity of the site is used for irrigation, livestock watering, and domestic purposes.

5.2.4 Impacts on Hydrology

Cedar Creek has been impounded to create a 2,400 acre cooling pond. Currently, the water quality of the cooling pond is similar to that of Cedar

Table 19. Cooling pond water quality, Fayette Power Project, July - August, 1978.*

	Average	July	August
pH	8.22	8.11	8.32
Conductivity	596 µmhos	572 µmhos	620 µmhos
Calcium	44.4 mg/l	45.6 mg/l	43.2 mg/l
Magnesium	19 mg/l	21.9 mg/l	16 mg/l
Total Hardness	189 mg/l	203 mg/l	174 mg/l
CO_3	2 mg/l	0 mg/l	4 mg/l
HCO_3	144 mg/l	153 mg/l	135 mg/l
TSS	3 mg/l	5 mg/l	1 mg/l
TDS	334 mg/l	343 mg/l	324 mg/l
Turbidity	1.5 NTV		1.5 NTV

* Pond level - 390 feet above sea level.

SOURCE: Lower Colorado River Authority. 1978. Water analysis, Fayette Power Project, August 1977 - August 1978. Austin TX. 12 p.

Table 20. Groundwater data for wells in Fayette County.

Formation	Total Dissolved Solids Range in ppm	Salinity (ppm of Chlorides)	Remarks
Carizzo Sand	1090	71	pH 8.6; poor quality
Sparta Sand	500-1500	77-448	Suitable for stock irrigation
Yegua Formation	179-7500	15-3380	Quality varies; high salinity hazard most wells
Jackson Group	279-8200	55-3800	Quality varies; high salinity hazard some wells
Catahoula Formation	320-2280	7-900	Generally hard, but suitable for irrigation
Oakville Sandstone	199-2700	12-405	Generally hard, but overall good quality; suitable for most purposes
Alluvium	317-1290	10-368	Hard, but suitable for most purposes

SOURCE: Lower Colorado River Authority. 1978. Environmental assessment of the Fayette Power Project. Volume 1. Austin TX. p. 3-31.

Creek before impoundment. However, when power plant operations begin, significant water quality and quantity changes may occur.

Due to the impoundment of Cedar Creek, the downstream flow of Cedar Creek is likely to continue its intermittent nature but with a somewhat smaller volume after rainfall and with a more consistent flow during dry periods. The Fayette Power Project will be required to maintain a minimum of 0.5 cfs continuous discharge from the cooling pond. Although it is estimated that the reservoir will not actually discharge water for several years during low rainfall periods, it is expected that seepage from the dam will maintain at least the minimum required flow.

The cooling pond probably will be monomictic (overturn of epilimnion and hypolimnion occurs once a year), with thermal stratification occurring during the summer months. During stratification, anaerobic conditions coupled with elevated levels of carbon dioxide and lowered pH will prevail in the hypolimnion. The levels of certain metals (iron, manganese, lead, aluminum) currently found in the water of Cedar Creek indicate that possible metal buildup could occur in the hypolimnion. Chemical conditions in the hypolimnion are conducive to high solubility of these metals and the stratified nature of the pond will prevent mixing and dilution.

LCRA has predicted that blowdown releases from the cooling pond will not be required for at least seven years after operation begins. When blowdown is finally required, the potential will exist for the discharge of dissolved iron, manganese, lead, and aluminum to Cedar Creek during pond stratification periods, if water were to be withdrawn from the oxygen deficient hypolimnion (bottom). However, the pond discharge system has the capacity to withdraw water from varying depths to prevent significant discharges of dissolved metals. Those dissolved metals which might be discharged could rapidly precipitate as hydroxides and oxides on the bottom of Cedar Creek within a short distance of the dam.

Other water quality standards as set forth by the Texas Department of Water Resources and the USEPA are expected to be met by plant discharges.

Based on other LCRA power plant projects on the Colorado River, it is expected that the plant will meet the effluent discharge characteristics for chlorine as required by 40 CFR 423. Discharge temperatures into Cedar Creek have been calculated under "worst case" conditions to remain well within the TDWR's mixing zone-related temperature standards. In addition, the discharge will not cause the Colorado River to exceed the total dissolved solids standard of 500 mg/l (BPC 1974b).

Groundwater quality is not anticipated to be significantly impacted by power plant operations. The total dissolved solids (TDS) and chlorine levels forecasted for the cooling pond during worst case conditions will not exceed the 900 mg/l and 1,100 mg/l permit limits for TDS or the 0.2 mg/l and 0.5 mg/l permit limits for chlorine. These maximum operating levels of TDS and chlorine are anticipated to be lower than the existing groundwater concentrations of these pollutants. As a result, cooling pond seepage which recharges the groundwater table should not affect groundwater quality.

The long-term water resources utilized by the Fayette Power Project will include makeup water for the cooling pond. The amount of makeup water required from the Colorado River is estimated to be 36 cfs or about 26,000 acre-feet per year. The long-term productivity of the River is not expected to be influenced by this withdrawal. Development and population growth induced by project development also will increase the use of groundwater in the project area. However, the increase in groundwater withdrawal is expected to be minimal, and the Fayette Power Project is not expected to significantly affect any existing water uses and supplies.

The only portion of the Fayette Power Project lying within the 100 year flood plain is the makeup water intake structure. It is designed to withstand water levels of up to 239.5 ft MSL without flooding the electrical and mechanical equipment. Although the 100 year flood plain reaches an elevation of approximately 250 ft MSL, no significant environmental impacts would result from potential inundation of the structure. The supply of makeup water for the cooling pond would be temporarily interrupted while the pump is inundated and repaired. However, the cooling pond has sufficient

excess capacity which would allow the plant to continue operating. The cooling pond dam and power generation facilities have all been designed to accommodate the 100 year flood without any environmental damage or interruption of operations.

5.3 AIR QUALITY

5.3.1 Climatology

Long-term climatological data from several National Weather Service Stations surrounding the project site may be used to characterize the climatic conditions of the project area. The subtropical climate is dominated by the southerly flow of warm, moist air from the Gulf of Mexico during the summer, and by the flow of cooler, dry air from the north during the winter. The mean annual temperature and precipitation are approximately 69 F and 42 inches respectively, with the greatest amount of precipitation occurring during May through August.

5.3.2 Dispersion Meteorology

The dispersive capacity of the atmosphere at the site has been characterized based on surface and upper air (mixing height) weather data from National Weather Service Stations at Austin, Houston, and San Antonio, Texas, and from previous studies of Holzworth (1972, 1974) and Korshover (1976). According to Stability Array (STAR) data summaries (frequency distributions of wind speed, direction, and atmospheric stability) for Austin and Houston (Tables 21 and 22), there is a fairly high frequency of occurrence (17 - 24%) of stable conditions, during which an elevated power plant plume would be isolated from the ground, and a fairly high annual average wind speed (about 16 ft/sec) at the site. However, there also is a relatively high frequency (15 - 20%) of unstable conditions, during which an elevated plume would be mixed more readily toward the ground, and a significant persistence of wind direction which would be conducive to greater ground-level impacts (Figure 10).

The afternoon atmospheric mixing height generally reaches a level sufficiently high to allow effective pollutant dispersion to occur (Table 23).

Table 21. Stability array (STAR) results for Austin/Bergstrom Station (1955 - 1964).

Period	Frequency of Stability Classes (Per Cent)								Prevailing Winds & Calms			
	A	B	C	Neutral Day D	Neutral Night E	F	G	H	DIR	AVG SPEED (meters/sec)	SW %	CLM %
Annual	1.7	7.0	10.8	22.9	23.5	9.9	12.4	11.9	S	4.6	24.1	15.1
Winter	0.3	3.6	6.4	24.7	32.4	8.7	11.8	12.0	N	5.4	19.1	16.2
Spring	1.4	5.1	10.2	28.9	28.3	8.8	9.5	7.9	S	5.3	26.6	11.8
Summer	3.7	11.2	16.7	17.9	13.7	12.5	13.9	10.4	S	4.4	35.2	13.0
Fall	1.1	8.1	9.8	20.2	19.7	9.4	14.5	17.1	S	4.1	20.0	19.6

SOURCE: Lower Colorado River Authority. 1978. Environmental asscssment of the Fayette Power Project. Volume 2. Austin TX. p. A-60.

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Table 22. Stability array (STAR) results for Houston/Hobby Station (1955 - 1964).

Period	Frequency of Stability Classes (Per Cent)								Prevailing Winds & Calms			
	A	B	C	Neutral Day D	Neutral Night E	F	G	H	DIR	AVG SPEED (meters/sec)	SW %	CLM %
Annual	0.8	4.7	9.6	27.3	26.8	14.2	11.7	4.9	SSE	5.6	14.7	2.1
Winter	0.0	1.6	4.9	28.9	41.6	13.1	7.5	2.3	NNW	6.3	9.7	1.4
Spring	0.6	3.4	8.6	32.6	32.2	11.7	8.1	2.9	SE	6.0	14.2	1.8
Summer	2.1	9.0	15.9	22.4	9.7	16.1	16.9	7.8	SSE	4.9	20.0	3.3
Fall	0.4	4.8	9.3	25.1	23.6	16.0	14.4	6.4	SSE	5.3	10.3	2.0

SOURCE: Lower Colorado River Authority. 1978. Environmental assessment of the Fayette Power Project. Volume 2. Austin TX. p. A-61.

Figure 10. Wind rose for Austin, Texas (LCRA 1978a).

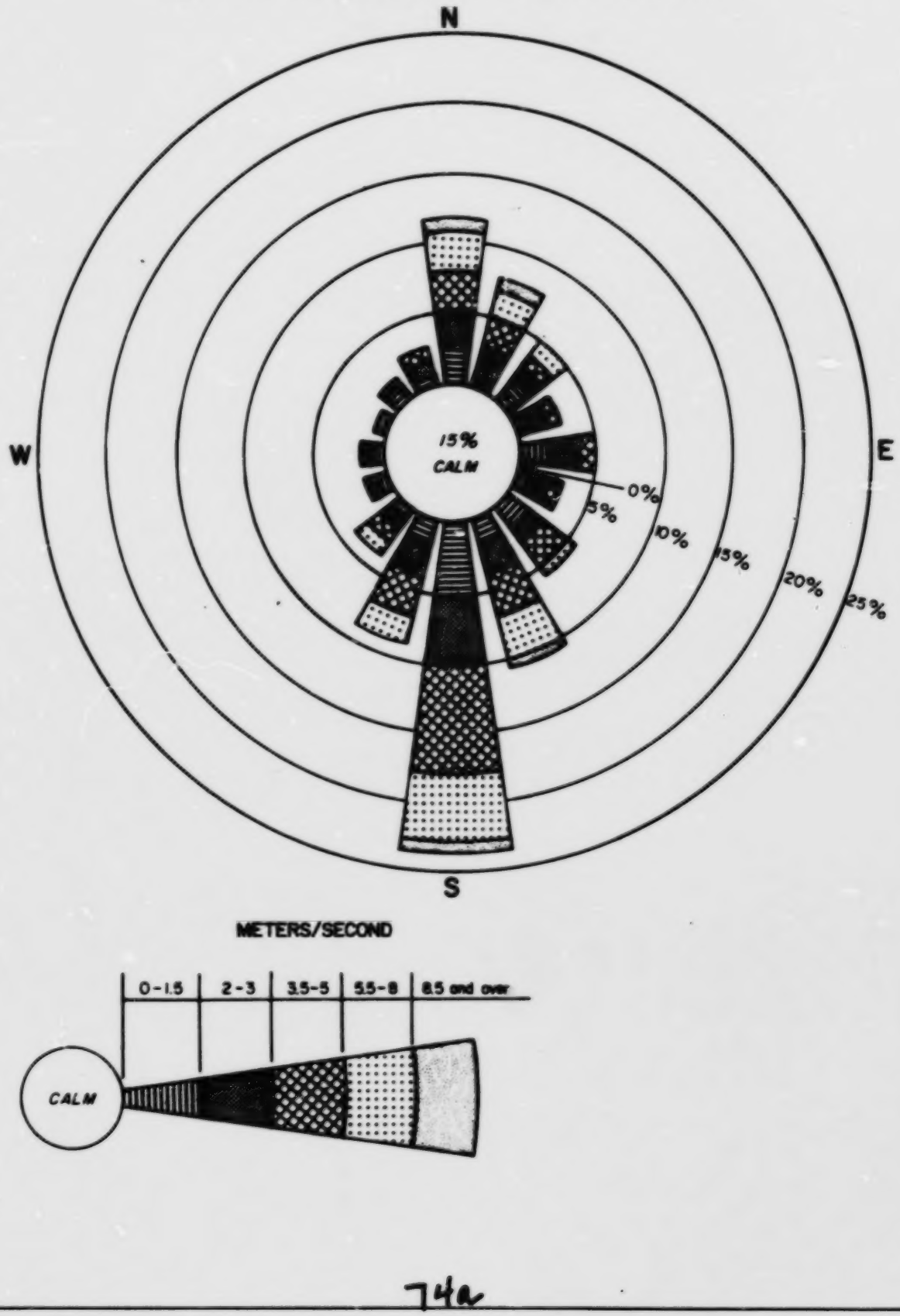


Table 23. Mean seasonal and annual morning (M) and afternoon (A) mixing heights (H) and wind speeds (U) for all cases.

Station	Time	Winter		Spring		Summer		Autumn		Annual	
		H(m)	U (ms^{-1})	H(m)	U (ms^{-1})	H(m)	U (ms^{-1})	H(m)	U (ms^{-1})	H(m)	U (ms^{-1})
Lake Charles, Louisiana[1]	M	394	6.7	459	5.7	506	4.1	308	4.5	417	5.3
	A	867	7.5	1,179	7.0	1,392	5.2	1,315	5.8	1,188	6.4
San Antonio, Texas[2]	M	459	5.8	748	6.5	915	5.7	654	5.5	694	5.9
	A	1,112	6.8	1,552	7.2	2,119	6.0	1,572	6.1	1,589	6.5

(1) 1/1/62 - 12/31/64

(2) 1/1/60 - 12/31/64

SOURCE: Holzworth, G. C. 1972. Mixing heights, wind speeds, and potential for urban air pollution throughout the contiguous United States. Prepared for USEPA, Office of Air Programs. Research Triangle Park NC.

Analyses of episodes of limited atmospheric mixing and transport and or large-area stagnation were reviewed by LCRA, and the site was determined to be in an area with high potential for good air quality.

5.3.3 Air Quality

Based on site-specific monitoring data (Table 24), supplemented by data from surrounding rural and urban areas, ambient pollutant concentrations at the Fayette project site were estimated to be within the Texas and National Ambient Air Quality Standards (NAAQS) (Table 25). Air quality monitoring was begun at the Fayette site during October 1977 and will continue during plant construction and operation. The ambient concentrations of total suspended particulate matter (TSP), sulfur dioxide (SO_2), and nitrogen dioxide (NO_2) are being monitored at three stations near the Fayette Power Project

Table 24. Summary of air quality monitoring at the Fayette Power Project Site (October 1977 through March 1978).

Pollutant and Averaging Time	Concentration			
	Site 1	Site 2	Site 3	All (c)
Sulfur Dioxide, ppm				
6-month (a)	0.002	0.001	0.001	0.002
24-hour (b)	0.006	0.005	0.004	0.006
3-hour (b)	0.007	0.003	0.016	0.016
Particulate Matter, $\mu g/m^3$				
6-month (c)	27	23	29	29
24-hour (b)	170(d), 74(e)	57(e)	171(d), 67(e)	170(d), 74(e)
Nitrogen Dioxide, ppm				
6-month (a)	0.009	0.009	0.007	0.009

Notes: (a) Arithmetic mean for the six-month period.
(b) Highest value measured during the six-month period.
(c) Geometric mean for the six-month period.
(d) During dust storm.
(e) Non-dust storm value.

SOURCE: TERA Corporation. 1978. Quarterly data report No. 1 and No. 2, Fayette Power Project air monitoring system. Dallas TX.

Table 25. Estimated air quality at the Fayette Power Project Site and ambient air quality standards.

Pollutant and Averaging Time	National Ambient Air Quality Standards (a) Primary $\mu g/m^3$(ppm)	Secondary $\mu g/m^3$(ppm)	Fayette Site Concentrations (e) $\mu g/m^3$(ppm)
Sulfur Dioxide			
Annual Arithmetic Mean	80 (0.03)	-	5 (0.002)(f)
24-hour	365 (0.14)(b)	-	16 (0.006)(f)
3-hour	-	1,300 (0.5)(b)	42 (0.016)(h)
Particulate Matter			
Annual Geometric Mean	75	60(guide only)	29 (h)
24-hour	260(b)	150(b)	74(f,i)
Nitrogen Dioxide			
Annual Arithmetic Mean	100 (0.05)	100 (0.005)	18 (0.009)(f,g)
Carbon Monoxide			
8-hour	10 (9)(b)	10 (9)(b)	within standard (c)
1-hour	40 (35)(b)	40 (35)(b)	within standard (c)
Non methane Hydrocarbons			
3-hour (6-9 a.m.)	160 (0.24)(Guide to achieve oxidant standard)(b)		within standard (d)
Oxidants			
1-hour	160 (0.08)(b)	160 (0.08)(b)	within standard (d)

Notes:
(a) Texas standards for Fayette County are the same as National standards.
(b) Not to be exceeded more than once per year.
(c) Monitoring data from Austin for 1974 and 1976 were within standard. Emissions of CO are lower in the rural project area.
(d) Fayette County is not listed as a nonattainment area by the EPA (43 FR 8962; 43 FR 40412).
(e) Based on six months (October 1977 through March 1978) of site specific monitoring data.
(f) Station 1, 3.2 km (2 miles) north of stacks.
(g) Station 2, 7.2 km (4.5 miles) east of stacks.
(h) Station 3, 7.2 km (4.5 miles) south-southeast of stacks.
(i) Non dust-storm.

SOURCE: 36 Federal Register. 30 April 1971. p. 8186.

site; they are located 2 miles north, 4.5 miles east, and 4.5 miles south-southeast of the stacks. Average and maximum concentrations corresponding to NAAQS averaging times were determined from the site-specific data for the monitoring period of October 1977 through March 1978. Although these values represent only one-half of a full year's data, they are believed to be representative of the baseline SO_2, TSP, and NO_2 air quality of the site since background levels measured at rural sites in Travis and Matagorda Counties are similar to these site-specific levels.

Available data for the Fayette vicinity were insufficient to quantify site levels of CO, HC, AND O_x. However, CO levels are assumed to be well below standards because levels measured in Austin, where there is a much greater concentration of CO emission sources, are below standards. Ambient levels of HC and O_x have been assumed to be within standards because Fayette County is not listed as a non-attainment area for these pollutants (43 FR 8962; 43 FR 40412). However, violations of O_x standards and HC guidelines are known to occur even in very remote areas as a result of long-distance transport. Thus, it can only be concluded with reasonable certainty that such violations do not occur as a result of the low emission rates in the project area.

5.3.4 Prevention of Significant Deterioration

In accordance with the Prevention of Significant Deterioration (PSD) regulations of Title 1, Part C of the amended Clean Air Act (40 CFR 52), the Applicant has shown that the operation of Unit 2 of the Fayette Power Project will: (1) not cause a violation of Class II air quality deterioration increments of sulfur dioxide (SO_2) and total suspended particulate matter (TSP); (2) not cause a violation of NAAQS; (3) not have an impact on the air quality of any Class I areas; and (4) be designed to include the Best Available Control Technology (BACT) to reduce emissions of SO_2 and TSP. Unit 1 is not subject to PSD regulations since the Texas Air Control Board (TACB) construction permit for Unit 1 was obtained prior to the effective date of original PSD regulations issued in 1974 (40 CFR 52.21). The proposed project area has been designated as a Class II PSD area, and since the nearest Class I PSD areas are more than 340 miles to the north-northwest (Wichita

Mountain Wilderness Area in Oklahoma) and over 400 miles to the west-southwest (Big Bend National Park in Texas), the project will not affect the air quality of any Class I areas.

To assess compliance with the allowable PSD Class II increments, it must be shown that the ambient concentrations of SO_2 and TSP will not increase by more than the allowable increments over the baseline air quality levels of 6 January 1975. To this end, the effects of all other point sources in the vicinity of the Fayette Power Project which commenced construction after 6 January 1975, the effects of general growth or reductions in emissions from other source types, as well as the effects of Fayette Units 1 and 2 were evaluated. Through inspection of a list of all new point sources within a 30 mile radius of the Fayette Project (Table 26), it was concluded that the effects of other new point sources in the Fayette project vicinity will be negligible. The emissions resulting from commercial, industrial, residential, agricultural, and other growth and development were estimated using a computerized projection method developed by the TACB, and it was assumed that resulting air quality changes will be proportional to changes in emissions from these sources.

The estimated deterioration of SO_2 and TSP air quality over baseline (6 Janaury 1975) levels, resulting from other point sources, general growth, and Fayette Units 1 and 2 is within the allowable PSD Class II increments for annual (20 $\mu g/m^3$), 24-hour (91 $\mu g/m^3$), and 3-hour (512 $\mu g/m^3$) SO_2 emissions and annual (19 $\mu g/m^3$) and 24-hour (37 $\mu g/m^3$) particulate emissions (Table 26).

5.3.5 Impacts on Air Quality

To estimate the air quality effects of the stack emissions from the Fayette Power Project, emission data for each unit, terrain elevations in the plant vicinity, and meteorological data from the National Weather Service Stations in Austin and San Antonio were input to the USEPA single-source (CRSTER) atmospheric dispersion model. The model was used to estimate both the short-term (1, 3, 8, and 24-hour) and long-term (annual average) ground level concentrations of the SO_2, TSP, NO_2, HC, and CO to be emitted during

Table 26. Summary of compliance with PSD regulations for SO_2 and TSP in the Fayette Power Project vicinity.

Pollutant and Averaging Time	Allowable Class II Increments (a, b)	Other Sources		Fayette Power Project		Total Deterioration(b)	Remaining Increment (b)
		Deterioration Due To Other Point Sources (b, c)	Deterioration Due to Area Sources (b,d)	Deterioration Due to Unit 1 (b, e)	Deterioration Due to Unit 2 (b, e)		
SO_2							
Annual	20	Negligible	0.55	1.59	1.66	3.80	16.2
24-hour	91	Negligible	1.76	15.5	16.3	33.6	57.4
3-hour	512	Negligible	4.62	103	108	216	296
Particulates							
Annual	19	Negligible	0.67	0.04	0.04	0.75	18.3
24-hour	37	Negligible	1.70	0.44	0.42	2.56	34.4

Notes: (a) From Federal Register, Vol. 42, No. 212, Thursday, November 3, 1977, pages 54759-54762 40 CFR Part 52--Approval and Promulgation of State Implementation Plans.

(b) All concentration values in micrograms per cubic meter.

(c) Lower Colorado River Authority. 1978. Environmental assessment of the Fayette Power Project. Volume 2. Austin TX. pp. A-97 - A-101.

(d) Lower Colorado River Authority. 1978. Environmental assessment of the Fayette Power Project. Volume 2. Austin TX. p. A-102.

(e) Based on estimated maximum second-highest 3- and 24-hour average concentrations and the estimated maximum annual average using the CRSTER model.

the operation of boiler units 1 and 2 of the Fayette Power Project (Table 27). Concentration estimates were made for 12 distances of up to 30 miles in each of 16 compass directions from the source, and the locations and values of the highest concentrations were determined. The dispersion estimates were conservative (tending to overestimate impacts) due to the use of emission rates based on fuels having maximum sulfur and ash content and minimum heating value (actual fuels will be cleaner and have a higher average heating value); the assumption of constant plant operation at maximum continuous rating; and certain inherently conservative aspects of the CRSTER model.

To evaluate the potentially significant short-term atmospheric dispersion condition called inversion breakup fumigation (which is not considered by CRSTER), separate manual calculations were performed according to techniques recommended by Turner (1970) and the USEPA (1974a). The results showed that inversion breakup fumigation impacts would be significantly less than maximum short-term levels estimated by CRSTER; therefore, this would not be a critical plume dispersion condition for the Fayette Project (Table 27).

Compliance with NAAQS was assessed by adding the maximum estimated air quality effects of boiler units 1 and 2 to the estimated baseline air quality levels prior to plant construction. (Baseline air quality was estimated from available on-site monitoring data.) Projected SO_2, TSP, NO_2, and CO levels will meet NAAQS, and HC and oxidant levels also are expected to be within the appropriate standards (Table 27). As a result, no significant adverse impacts on air quality should result from plant operations.

Atmospheric emissions of fugitive dust will result from coal storage, handling, and processing operations. Although these types of fugitive emissions are not easily quantified, effects on air quality should normally be confined to the LCRA owned property, which consists of approximately 7,500 acres. Several air pollution control measures will be used to prevent dust from becoming airborne. Dust from grading, excavating, and vehicular traffic will be reduced by the use of water sprays or other wetting agents, and permanent roads and parking lots will be maintained and resurfaced as needed to reduce dust. Fugitive dust emissions during coal handling and

Table 27. Compliance of maximum and maximum second-highest air quality impacts of the Fayette Power Project with NAAQS.

Pollutant and Averaging Period	Baseline Ambient Concentrations, $\mu g/m^3$	Concentrations due to Fayette Boilers, $\mu g/m^3$	Future Ambient Concentrations, $\mu g/m^3$	National Ambient Air Quality Standards Primary, $\mu g/m^3$ (ppm)	Secondary, $\mu g/m^3$ (ppm)
Sulfur Dioxide					
Annual	5 (a)	3.26 (d)	8 (d)	80 (0.03)	-
24-hour	16 (a)	31.8 (e)	48 (e)	365 (0.14)(f)	-
3-hour	42 (a)	211 (e)	253 (e)	-	1,300(0.5)(f)
Particulate Matter					
Annual	29 (a)	0.08 (d)	29 (d)	75	60(guide only)
24-hour	74 (a)	0.86 (e)	75 (e)	260 (f)	150 (f)
Nitrogen Dioxide					
Annual	18 (a)	1.98 (d)	20 (d)	100 (0.05)	100 (0.05)
Carbon Monoxide					
8-hour	within standard(b)	5.07 (d)	within standard	10,000(9)(f)	10,000(9)(f)
1-hour	within standard(b)	30.5 (e)	within standard	40,000(35)(f)	40,000(35)(f)
Hydrocarbons					
3-hour	within standard(c)	2.80 (d)	within standard	160(0.24)(guide only)	-
Oxidants					
1-hour	within standard(c)	Negligible	within standard	160(0.08)(f)	160(0.08)(f)

Notes: (a) Based on six month on-site monitoring data (Table 24).
(b) Monitoring data from Austin for 1974 and 1977 were within standard; CO emissions in project area are lower.
(c) Fayette County is not listed as a nonattainment area by the USEPA, (43 FR 8962; 43 FR 40412).
(d) Maximum.
(e) Maximum second-highest.
(f) Not to be exceeded more than once per year.

SOURCE: Lower Colorado River Authority. 1978. Environmental assessment of the Fayette Power Project. Volume 2. Austin TX. pp. A-80 - A-83.

processing operations will be minimized through the use of wet sprays, a bag filter collection system, and a telescoping chute on the coal stackout boom, and the coal storage pile will be compacted and wetted as required to prevent fugitive dust emissions and spontaneous combustion. A wet ash handling system will minimize potential dust emissions from fly ash handling. As a result, fugitive dust emissions from the project are expected to be minimal, confined primarily to the project site.

The evaporation of water and the dissipation of heat from the 2,400 acre cooling pond will affect local meteorology, primarily by increasing fog or ice formation. A computer model was used to evaluate the potential cooling pond effects based on climatological data from the National Weather Service Station in Austin for the period from 1955 through 1964 (1957 was selected as the year of maximum impacts), and expected cooling pond temperature and heat input data.

Based on modeling results, the pond may increase the hours of fog as much as 305 hours per year over the estimated natural frequency of 725 hours per year, and the greatest hourly increases would occur in April, May, and June (Table 28).

Table 28. Estimate of monthly distribution of natural and increased hours of fog at the Fayette Power Project.

	Natural Occurrence Without Pond		Occurrence With Pond	
Month	Hours	Percent of Period	Increase in Hours	Percent of Period Increase
January	124	17	31	4
February	60	9	23	3
March	75	10	27	4
April	67	9	41	6
May	29	4	46	6
June	20	3	48	7
July	0	0	0	0
August	0	0	0	0
September	41	6	20	4
October	87	12	25	3
November	168	23	34	5
December	54	7	8	1
Year	725	8	305	4

SOURCE: Lower Colorado River Authority, 1978. Environmental assessment of the Fayette Power Project. Volume 2. Austin TX. p. A-91.

During all months except April, May, and June, the occurrences of persisting fog (six hours or more) would tend to increase in number, but the total number of all fog occurrences would not increase significantly (Table 29).

Table 29. Cases of fog and persisting fog at the Fayette Power Project

Month	Natural Cases Without Pond: Number of Fog Cases	Natural Cases Without Pond: Number of Cases Persisting 6 Hours or More	Increased Cases With Pond: Increased Number of Fog Cases	Increased Cases With Pond: Increased Number of Cases Persisting 6 Hours or More
January	21	7	-4*	0
February	16	2	6	2
March	17	6	3	3
April	19	4	10	4
May	9	0	16	4
June	8	0	11	4
July	0	0	0	0
August	0	0	1	0
September	13	3	2	1
October	26	5	1	3
November	23	9	0	6
December	15	3	3	1
Year	167	39	49	28

Note: *In January, the total number of cases decreases without increasing the number of persistence cases, since the pond lengthens the persistences by joining new cases so they become consecutive.

SOURCE: Lower Colorado River Authority. 1978. Environmental assessment of the Fayette Power Project. Volume 2. Austin TX. p. A-92.

Thus, the presence of the pond would normally tend to lengthen existing occurrences of fog by one or two hours without adding many new occurrences during these months.

The increased occurrence of fog would result in reduced visibility on nearby roadways. The section of Old State Highway 159 north of the pond would experience the most significant effect.

Regarding icing, no significant impact is anticipated. The cooling pond may very infrequently cause increased occurrence of rime ice during the few periods in January and December when temperatures of 22 F or below occur.

5.4 SOUND QUALITY

5.4.1 Existing Conditions

The baseline existing ambient noise data reported in the Environmental Assessment were measured in units of L_{10}, L_{50}, and L_{90} on the A-weighted scale (dBA). The existing ambient noise levels were sampled at the following five locations (Figure 11):

- Location #1 - Cooling pond intake (point of closest public approach).
- Location #2 - River intake (point of closest public approach).
- Location #3 - Nearest occupied residence to the power plant.
- Location #4 - Nearest occupied residence to the cooling pond.
- Location #5 - The closest approach to the plant site boundary with probability for the highest noise level.

To compare the measured ambient noise levels with the USEPA identified levels for the protection of the public health and welfare (USEPA 1974b), the equivalent sound level (L_{eq}) of the measured noise levels must be determined. A procedure developed by USEPA (1978) was used to convert the measured L_{10} data to L_{eq} data (Table 30). These identified levels suggest that annual day/night sound levels (L_{dn}) below 55 dB do not degrade the public health and welfare. Outdoor (speech) and indoor (speech and sleep) activity interference and hearing loss are the principal considerations used to develop the above criteria. The effects of outdoor and indoor activity interference often result in individual and/or community annoyance. For this reason, the L_{dn} description applies a ten dB penalty to nighttime (2200-0700 hours) sound levels to compensate for the public's increased sensitivity to nighttime sound levels.

As indicated in Table 30, the measured existing day/night sound levels (L_{dn}) exceed the USEPA identified levels at all five sampling sites, ranging from a maximum of 13 dB at Location #5 and a minimum of 2 dB at Location #3. Neither the State of Texas nor Fayette County have noise control regulations to monitor ambient noise levels.

Figure 41. Noise sampling locations at the Fayette Power Project (LCRA 1978a).

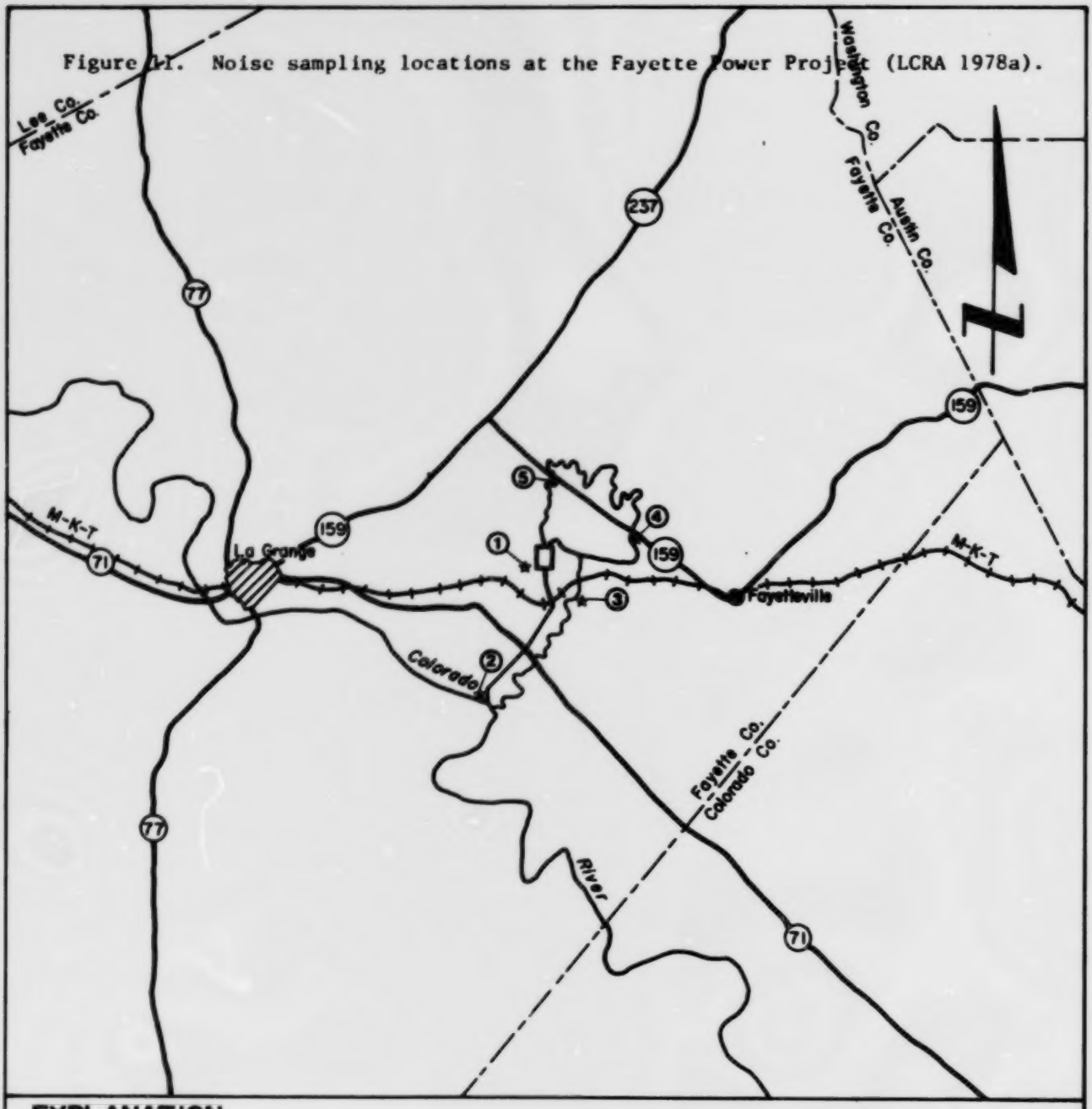


Table 30. Existing ambient noise levels (dBA) at the Fayette Power Project Site.

Location	Measured L_{10} Daytime[1]	Measured L_{10} Nighttime[2]	Calculated L_{eq} Daytime	Calculated L_{eq} Nighttime	L_{dn}
1	61	54	59	52	60
2	64	58	62	56	64
3	56	52	54	50	57
4	57	52	55	50	58
5	71	55	69	53	68

Notes: 1. Daytime period from 1700 to 2000 hours.
2. Nighttime period from 2000 to 0700 hours.

Abbreviations

The decibel (dB) as used herein is defined as:

Sound pressure level in decibels (dB) = $20 \log_{10} \left(\frac{P}{P_o}\right)$ re. 0.0002 microbar where:

P is the measured sound pressure
P_o is the reference sound pressure required for a minimum sensation of hearing.

L_d - Equivalent sound level (L_{eq}) for the daytime period (0700-2200 hours).
L_n - Equivalent sound level (L_{eq}) for the nighttime period (2200-0700 hours).
L_{eq} - This is the equivalent steady sound level which provides an equal amount of acoustic energy as the time varying sound.
L_{dn} - Equivalent day/night sound level, is defined as:

$$L_{dn} = 10 \log_{10} \left[\frac{15 \left[10^{\frac{L_d}{10}} \right] + 9 \left[10^{\frac{L_n + 10}{10}} \right]}{24} \right]$$

A 10 dB correction factor is added to the nighttime equivalent level.

L_{10} - The sound level exceeded 10% of the time.
L_{50} - The sound level exceeded 50% of the time.
L_{90} - The sound level exceeded 90% of the time.

SOURCE: Lower Colorado River Authority. 1978. Environmental assessment of the Fayette Power Project. Volume 1. Austin TX. p. 3-51.

5.4.2 Impacts on Sound Quality

The major sources of operational noise associated with the Fayette Power Project will be forced draft and primary air fans; induced draft fans; coal handling equipment including pulverizers, crushers, and reduction gear drivers on conveyors; motor drives for rotating equipment; control valves; high velocity pipelines such as main steam, feedwater, and hot and cold reheat; auxiliary turbine exhaust duct; and relief valve stacks. To model the operational noise of the Fayette Power Project, noise levels of the major sources of noise located at the power block were combined and extrapolated, using hemispherical sound radiation to the nearest residences (Figure 11, Locations 3 and 4). The cooling pond circulating water pumps, Colorado River makeup water supply pumps, and switchyard transformers and related electrical equipment are additional sources of noise which are not located at the power block. The noise contribution from this equipment was found to be insignificant to the nearest residences.

The noise contribution of the power block and coal handling equipment at 8,700 feet is calculated to be an equivalent sound level (L_{eq}) of 47 dBA assuming a continuous operational load factor of 85% for daytime and nighttime hours. This distance corresponds to the closest residence (Figure 11, Location 3) to the power block.

The operational noise level is calculated by combining the measured existing ambient sound levels with the noise levels generated by the power block (Table 31). These calculations indicate that the operation of the Fayette Power Project will not adversely impact the adjoining land uses and nearby residences. The only case of a significant increase in sound level is at Location 1. This increase is 4 dB during the daytime and 9 dB at night. This location is the point of closest public approach which will not be used during the nighttime. The increase in daytime sound level at this location will not be noticeable. The increased sound level at Location 3 will be subjectively imperceptible, having no impact on this land use and its inhabitants.

Table 31. Operational noise levels at the Fayette Power Project (dBA).

Location	Measured[a] Existing Ambient			Power Block Noise Contribution	Ambient During Operation		
	L_d[1]	L_n[2]	L_{dn}[3]		L_d	L_n	L_{dn}
1	59	52	60	60	63	61	68
2	62	56	64	39	62	56	64
3	54	50	57	47	55	52	59
4	55	50	58	43	55	51	58
5	69	53	68	45	69	54	68

Notes: 1. L_d is the daytime equivalent sound level.
2. L_n is the nighttime equivalent sound level.
3. L_{dn} is the day/night sound level.

SOURCE: Lower Colorado River Authority. 1978. Environmental assessment of the Fayette Power Project. Volume 1. Austin TX. p. 3-51.

The USEPA (1974b) has identified a sound level (L_{dn}) of 55 dBA to protect the public health and welfare with an adequate margin of safety. At each of the locations, the USEPA identified levels are exceeded in the range of 3 dB to 13 dB.

5.5 BIOLOGY

The scientific names of the common species mentioned in the text and the supporting biological data are presented in Appendix B of this document.

5.5.1 Aquatic Biota

5.5.1.1 Aquatic Habitats

The aquatic environment of the project area consists of Cedar Creek and its tributaries, a short stretch of the Colorado River, and numerous farm ponds. As described in Section 4.5.5, most of Cedar Creek, tributaries to

Cedar Creek, and the site farm ponds are not inundated. The following discussion includes a description of the habitats and biota of the inundated waterbodies as they existed prior to development. The lower segment of Cedar Creek and the Colorado River adjacent to the site have not been extensively modified by site development.

The plant site is located in an ecological transition zone between the upper Colorado River which is characterized by relatively clear water and the lower Colorado River which is more turbid. The distribution of aquatic animals in the Colorado River is related to these major ecological zones and to the east-west geographical occurrence of species in Texas. These factors in combination have led to the development of a diverse aquatic fauna characterized by an intermingling of eastern and western fishes (Tilton 1961). Rooted aquatic plants are not generally an important component of the habitat due to the turbidity of the river and the shifting substrate, although some development of rooted aquatic plants may occur during prolonged low water periods.

The upper three miles of Cedar Creek are characterized by a sandy bottom and few riffle or pool areas. Rooted aquatic vegetation is limited to the margins of the pools. The middle 1.5 miles of the stream is typically a series of riffles and pools with a substrate of sandstone slabs and boulders which is almost completely devoid of aquatic vegetation. The lower two miles of Cedar Creek are characterized by large pools (up to 8.2 feet deep) and occasional cobble riffles. There is little or no aquatic vegetation within the stream banks here, but large amounts of woody detritus tend to accumulate in the pools.

5.5.1.2 Plankton

Data for phytoplankton and zooplankton at the site are limited to one sampling period in July of 1975. The densities found in both Cedar Creek and the Colorado River were quite low, undoubtedly due to the flushing action of rains immediately preceding the sampling. The types of plankters collected were typical of the habitats sampled (Appendix B, Tables 1 and 2).

5.5.1.3 Larger Aquatic Animals

5.5.1.3.1 Macroinvertebrates

Benthic macroinvertebrates were not collected in the Colorado River, but the presence of large numbers of freshwater clams was noted. No further data are available for the River adjacent to the site.

Cedar Creek was sampled in the upper, middle, and lower sections in several representative pool and riffle habitats by Surber sampler and by kick samples. One series of samples was collected in the summer of 1975. All sampling locations contained low numbers of macroinvertebrates (about 70 individuals per m^2 in riffles) with the sandstone substrate in mid-stream particularly depauperate (Appendix B, Table 3).

The permanent gravel riffles in the lower reaches and the pools throughout the stream supported the widest variety of macroinvertebrates, with odonates (dragonflies and damselflies) and mayflies of the common genera Caenis and Siphlonurus abundant in the pools. The permanent gravel riffles also supported abundant populations of odonates, the free swimming mayfly and genera Isonyschia and Paraleptophlebia, and the caddisfly genera Cheumatopsyche and Chimaera. These types of macroinvertebrates are common to small streams in Texas which contain a mixture of pool and riffle habitats.

Although populations and diversities were doubtless higher during other seasonal periods, an evaluation of the habitat and the biogeographical location of Cedar Creek indicates that the stream had a low potential for the support of any unique or unusual populations of macroinvertebrates.

5.5.1.3.2 Finfish

Collections were made at the site for one day in early July 1975. Cedar Creek was sampled in its upper, middle, and lower reaches, and the Colorado River was sampled at three stations adjacent to the site. Of the 64 species whose distribution ranges include the site, 20 were collected

in the single sampling effort. Table 4 of Appendix B lists the fishes which may occur in the waters of Cedar Creek and the Colorado River and notes those captured during the site survey.

The July 1975 collections in the Colorado River revealed species typical of large turbid rivers. The catch was dominated numerically by small forage fishes such as the red shiner, Texas shiner, blacktail shiner, bullhead minnow, and young of year gizzard shad and carp. Sunfishes such as largemouth bass, green sunfish, bluegill, spotted sunfish, and warmouth were also collected but in smaller numbers. Other common riverine species such as the channel catfish and gray redhorse comprised the balance of the catch (Appendix B, Table 5).

Although the collections adjacent to the site were inadequate to document the species composition in this reach of the Colorado River, the species which may occur in the area and the generally good water quality and habitat present, in combination with the species that were collected in the site survey lead to the conclusion that the fish fauna is relatively diverse and abundant. It is likely that most or all of the 64 species listed do utilize the Colorado River adjacent to the site some time during their life cycles.

The July 1975 collections in Cedar Creek indicated that the fish community was dominated by sunfish (bluegill, largemouth bass, green sunfish, spotted sunfish, and longear sunfish) with forage fishes such as mosquito fish, red shiner, and spottail shiner well represented. Although further seasonal collecting efforts may have placed additional species on the list, an evaluation of the available habitat and water quality in Cedar Creek leads to the conclusion that the ichthyofauna were basically sunfish - shiner dominated.

5.5.1.3.3 Reptiles, Amphibians, Mammals, Waterbirds

There is a variety of habitats associated with the Fayette Power Project site which support characteristic associations of amphibians, reptiles, mammals, and waterbirds. These areas are important not only as habitats for

the resident animals, but also because of their value as sources of moisture for other animals, especially during the frequent extended dry periods. Although a large number of animal species utilize habitats associated with the site waterbodies during various times of the year, the following is a list of common, characteristic faunal components:

Raccoon	Western ribbon snake	Great blue heron
Armadillo	Mississippi mud turtle	Great-tailed grackle
Banded water snake	Red-ear turtle	Red-winged blackbird
Rough green snake	Green heron	Wood duck
Leopard frog	Louisiana heron	Belted kingfisher

In addition to this list, a variety of other waterfowl utilize the site waterbodies during migratory periods.

5.5.1.4 Larger Aquatic Plants

This grouping basically includes the attached algae and the larger rooted or floating vascular plants (pondweed, milfoil, waterlilies). These plants were not directly sampled at the site, but general observations regarding their occurrence were made during the aquatic sampling period in July 1975. The observations indicated that both Cedar Creek and the Colorado River were essentially detrital based systems. The Colorado River, because of its generally high turbidity and resultant low light penetration, supports only limited development of algae or vascular plants. Cedar Creek supports a more consistent algae community, but the occurrence of rooted aquatic plants is limited to the margins of a few permanent pools.

5.5.2 Landscape Types

5.5.2.1 Wetlands

With the exception of the farm ponds, all of the landscape types on the site were vegetation types. The project site was a mosaic of grassland and woodland. Except for the immediate shoreline margins of Cedar Creek, the site farm ponds, and the Colorado River, no wetland vegetation existed on the site. Figure 12 depicts the landscape/vegetation types which existed

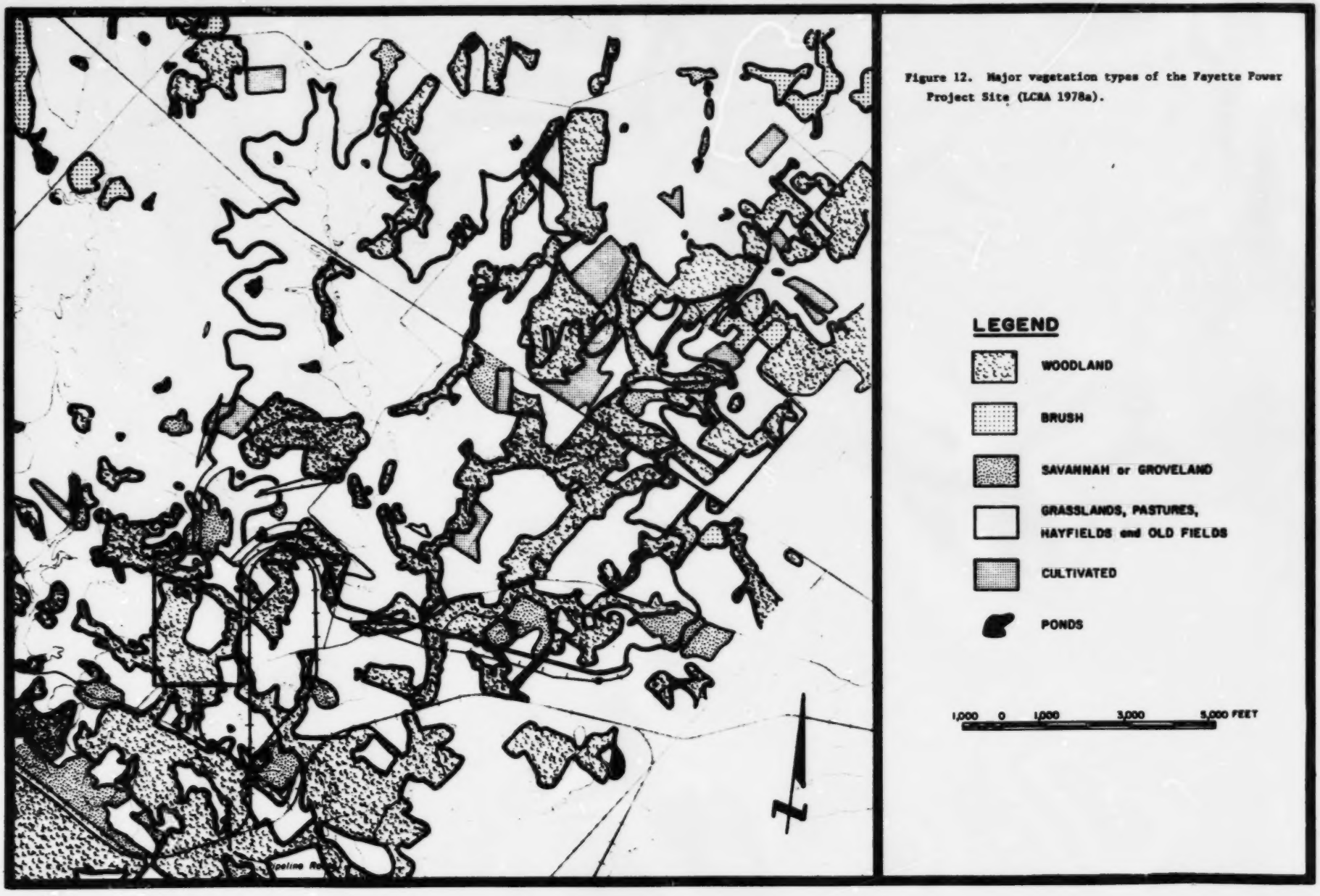


Figure 12. Major vegetation types of the Fayette Power Project Site (LCRA 1978a).

on the site.

5.5.2.2 Other Vegetation Types

Gould's (1975) delineation of the vegetational areas of Texas indicates that the site is near a line separating Blackland Prairie and Post Oak Savannah. The major vegetation types on the site include woodland, brush, savannah or groveland, grasslands, and cultivated land. A complete list of plant species collected during the site vegetation sampling during 1975 and detailed sampling results for specific habitat plots are presented in Appendix B, Tables 6 through 13.

5.5.2.2.1 Woodland

Lowland Forest Type - The lowland forest category is distinguished from the upland category mainly by its proximity to the floodplain. Throughout most of the site the trees characteristic of these stands were Texas sugarberry, eastern red cedar, water oak, Shumard's oak, red ash, cedar elm, and American elm. Lianas (climbing vines) were a common feature of the understory, the most important species being grape vines, rattan-vine, Virginia creeper, and peppervine. Common shrubs were yaupon, deciduous holly, hawthorns, rough-leaf dogwood, American beautyberry, swamp-privet, and poison ivy. The most common herbaceous species in the understory were frostweed and sessile-flowered spikegrass. In some areas, live oak, water oak, and red ash predominated with an understory as characterized above. In the floodplain of the Colorado River, oaks were present but less prominent than in other parts of the project area; cedar elm and red ash were the most common trees.

Upland Forest Type - This vegetation type is generally synonymous with Post Oak Savannah; however, the savannah aspect has been virtually obliterated as a result of grazing and the term woodland is probably more descriptive. The trees were mostly small and closely spaced and the grass layer had been shaded out except where occasional openings occurred in the overstory. The predominant upland woodland type occurred on relatively thin and infertile sandy soil and consisted mainly of eastern red cedar, post

oak, and blackjack oak. On sites with higher moisture and more fertile soil, post oak and blackjack oak tended to give way to mesic oak species such as water oak and Shumard's oak which are also characteristic of lowland stands.

The understory of the upland woods was similar in some respects to that of the lowland forests. Lianas were much less common and rattan-vine in particular was relatively less frequent. Shrub species were essentially the same, except that poison ivy occurred in less abundance and coral-berry was one of the most important species. Understory herbs were few with wild petunia and frostweed the most common. Prickly pear often occurred in the understory of the sandy uplands, another reflection of grazing pressure.

Riparian Trees - On the Colorado River, the narrow strips or clumps of trees were composed of species that generally predominate in riparian habitats, i.e., black willow, eastern cottonwood, sycamore, elms, and ashes. In other areas, the riparian strips were composed of less characteristically riparian trees, e.g., eastern red cedar. Depending on location, grazing pressure, and tree density, the understory varied from open and bermuda grass-covered to a dense growth of vines, shrubs, and herbs similar in composition to the lowland forest understory described above.

Cedar Groves - In some areas, eastern red cedars formed small, open stands in cleared fields. The understory varied with the openness of the stand but usually resembled oldfield or overgrazed native grasses.

Pine Groves - In the vicinity of Texas Hwy. 159, loblolly pines comprised a number of small stands which may be the result of plantings. The understory was scant or non-existent, as is characteristic of pine stands.

5.5.2.2.2 Brush

Brushland vegetation was composed primarily of huisache which had invaded a few overgrazed pastures. Mesquite also was present occasionally. Herbaceous species included those that tend to increase under grazing pressure, e.g., three-awn grasses, Texas grama, smutgrass, and weedy forbs such as ragweed.

5.5.2.2.3 Savannah or Groveland

Groveland consists of small groves of trees scattered in a matrix of grassland. In savannahs, the trees are scattered separately rather than in groves. The tree species present are primarily determined by the history of the land. Post oak, blackjack oak, and live oak were common, as were eastern red cedars. The predominant herbaceous cover ranged from native grasses to the weedy vegetation characteristic of old fields.

5.5.2.2.4 Grasslands, Hayfields, Old Fields, and Pastures

This category includes land that is characterized by the predominance of grasses and forbs and the absence of trees, brush and other woody species. Native grasslands, including both mowed hayfields and unmowed pastures, were generally dominated by tall grasses such as little bluestem, Indian grass, and species of Paspalum. Less important grasses included big bluestem, hairy grama, sideoats grama, silver beardgrass, tall dropseed, and needlegrass. Old fields were tracts of abandoned farmland characterized by infertile soil and weedy vegetation, including especially ragweed, wooly croton, prairie three-awn, broomweed, poor joe, and horse-weed.

Improved pastures included those seeded to palatable grasses, particularly coastal bermuda, dallis grass, Florida paspalum, or a combination of these.

5.5.3 Terrestrial Wildlife

5.5.3.1 Wildlife Habitats

The Fayette Power Project site lies near the southwestern tip of the Texan Biotic Province (Blair 1950) which represents a broad ecotonal or transitional area between the extensive, forested Austroriparian Province to the east and grassland provinces to the west. There are no endemic vertebrate species. The interdigitation of forests and grasslands results in a mixture of species typical of those two general habitats. Due to the

extreme intermixing of forest and grassland on the site, many species may be found in either major habitat type.

The site can be divided into several general faunal habitat types due to the close association of floral and faunal communities. The major distinction is between forested and nonforested areas, with the major habitat classifications being forest, grasslands and open fields, ponds or streams, and cultivated fields. The mosaic distributions of these habitats on the site result in some overlapping of faunal communities.

5.5.3.2 Wildlife

The wildlife of the site was sampled during the period from 1 July to 5 July 1975. Reptiles and amphibians were surveyed by general habitat reconnaissance and observation. Potential amphibian breeding areas also were visited at night and vocally active species were identified by their call. Birds were observed by direct observation in the various habitats, and a standard survey technique was utilized to determine the general abundance of bobwhite and mourning dove. Mammals were sampled both by general observation and semi-quantitative methods such as small mammal trapping and track-count lines.

5.5.3.2.1 Reptiles and Amphibians

According to Conant (1975) and Raun and Gehlbach (1972), 80 species of reptiles and amphibians have geographic ranges which include the site (Appendix B, Table 14). The site survey indicated the presence of 20 of these species on the site. The most common amphibians were Gulf Coast toads, southern leopard frogs, and cricket frogs. Common reptiles included the eastern box turtle, red-eared turtle, Mississippi mud turtle, Texas spiny lizard, five-lined skink, ground skink, six-lined race-runner, banded water snake, western ribbon snake, and Texas rat snake.

5.5.3.2.2 Birds

Peterson (1936) and Oberholser, et al. (1974) list 118 birds (not including possible winter residents or migrants) whose geographic ranges overlap the site (Appendix B, Table 15). Forty-four species were recorded during the site survey. The most commonly encountered species were the mockingbird, cardinal, painted bunting, scissor-tailed flycatcher, yellow-billed cuckoo, eastern meadowlark, downy woodpecker, lark sparrow, great-tailed grackel, red-winged blackbird, mourning dove, and turkey vulture. Other birds commonly found in the habitat types of the project site include Carolina chickadee, blue jay, indigo bunting, starling, house sparrow, robin, tufted titmouse, and killdeer. The results of the bobwhite and dove survey indicated a bobwhite density lower than the average for Fayette County and a dove density about equal to the County average (Appendix B, Table 16).

5.5.3.2.3 Mammals

Davis (1966) lists 42 species of mammals whose ranges indicate they may occur on the site (Appendix B, Table 17). Thirteen species were recorded during the one week site survey in 1975. The most common mammals noted were the white-tailed deer, armadillo, cottontail, jackrabbit, raccoon, and fox squirrel. Other mammals common to the habitats of the project site include gray fox, striped skunk, opossum, plains pocket gopher, hispid cotton rat, and long-tailed harvest mouse.

The results of the small mammal trapping indicated a low abundance of these animals on the site (Appendix B, Table 18). Only four wood rats and three white-footed mice were captured during 984 trap nights of effort. The track-count survey indicated that armadillo and white-tailed deer were fairly numerous on the site (Appendix B, Table 19). An estimate of about 17 deer per square mile was obtained for the one week period. This is within the 15 to 30 deer per square mile value listed for Fayette County by the Texas Parks and Wildlife Division as occurring over the past several years.

5.5.4 Endangered and Threatened Species

The following discussion of imperiled animals is based on the U.S. Department of Interior's (U.S. DOI) 3 April 1978 species list, and the Texas Parks and Wildlife Department's endangered and threatened species lists. The lists prepared by the Smithsonian Institution during 1975 for the U.S. Department of the Interior and by the Texas Rare Plant Study Center during 1974 were consulted for the evaluation of endangered and threatened plants.

5.5.4.1 Animals

The following species of animals have ranges and habitat preferences which could include the site or segments of the proposed transmission line corridors:

Common Name	Scientific Name	Status*
American alligator	Alligator mississippiensis	E
Houston toad	Bufo houstonensis	E
Bald eagle	Haliaeetus leucocephalus	E
American peregrine falcon	Falco peregrinus anatum	E

*E - Endangered

The alligator is rapidly increasing in number in Texas, and although alligators do not commonly occur in Fayette and other counties in the oak savannah-prairie region at present, they could become more common in the future. The Houston toad occurs in Bastrop and Buescher State Parks and surrounding areas. The total population of the Houston toad, which has been listed as endangered since 1970, is roughly 1,000 to 1,500 individuals (U.S. DOI 1978) and no specimens have been collected in Fayette County (Raun and Gehlback 1972).

The bald eagle is known to nest in Texas, but nesting is largely confined to the coastal region and to large bodies of water. No sightings were reported for Fayette County during 1971 to 1973 (Smith 1974). The bald eagle could pass through the project area in migration and possibly could winter there. The development of the cooling pond may attract eagles to

the area. The peregrine falcon is not a resident of the site, but individuals could pass through the area in migration and could occasionally winter there.

None of the above species was observed on the site during the 1975 summer biological survey, and none of these species can be reasonably expected to permanently reside or reproduce on the site based on their known distribution and habitat preferences.

5.5.4.2 Plants

The following species of plants have ranges and habitat requirements which could include the site or segments of the proposed transmission line routes:

Common Name	Scientific Name
Missouri maindenbush	Andrachne phyllanthoides
Rival lipfern	Cheilanthes aemula
Mullein foxglove	Dasistoma macrophylla
Texas almond	Prunus minutiflora
American tripogon	Tripogon spicatus

Missouri maidenbush is listed by the Rare Plant Study Center (1974) as "scarce and endangered" in Texas, but as distributed broadly but regionally in North America. Rival lipfern is listed as "very rare and acutely endangered" in Texas, but as distributed broadly but regionally in North America. Mullein foxglove is listed in the same general manner as Missouri maidenbush. The Texas almond is listed as "scarce and endangered" in Texas and largely is restricted to the southwestern U.S. However, it is distributed over several of the vegetational areas in the Edwards Plateau and Rio Grande Plains in Texas. American tripogon is listed as "very rare and acutely endangered in Texas", but as widely distributed on the North American Continent.

None of the above species was observed on the site during the 1975 biological survey. The new transmission line corridors were not surveyed.

5.5.5 Important Biological Resources

The site prior to development was a mosaic of land and water with a variety of open and forested areas which resulted in a biologically diverse and productive area. However, the site habitat is typical of much of east-central Texas. No particularly important habitats or communities existed or exist on the site or along the proposed transmission routes.

5.5.6 Parks, Preserves and Wildlife Refuges

No parks, preserves, or wildlife refuges occur on or immediately adjacent to the site or to the proposed transmission line corridors. The closest significant natural area to the site is the Buescher State Park near Smithville. This park is ecologically noteworthy because of the habitat which supports populations of several threatened or endangered plants and animals.

5.5.7 Impacts on Biological Resources

A potential for impacts to the Colorado River exists due to the operation of the makeup water intake facility. However, due to the small volume of water withdrawn during plant operation, the configuration of the intake screens, and the expected velocities at the screens, the intake facility is not expected to have a measurable impact on populations of aquatic species in the Colorado River. The USEPA has approved the operation of the makeup water facility and declared that the facility represents application of best available technology for minimizing harm (Section 6.4).

The primary impact on Cedar Creek is the conversion of several miles of intermittent stream habitat to a cooling pond. Other impacts which will affect the biology of Cedar Creek include flow regime changes and water quality changes. Although flow changes in the remaining downstream areas of Cedar Creek are difficult to predict, the intermittent nature of the stream is likely to continue with a somewhat smaller amplitude of flow after rainfall and a more consistent flow during drought periods. As a result, the biology of the lower section of Cedar Creek should remain similar to that which existed prior to impoundment. The potential discharge of dissolved

iron and other metals to Cedar Creek during coldside blowdown releases (Section 5.2.4) is likely to reduce benthic and algal productivity and hence fish abundance in the section of the Creek directly affected by the precipitates. However, it is unlikely that toxic effects from such discharges would occur due to the insoluble nature of precipitates. If close attention is paid to the water quality of blowdown releases and a suitable withdrawal scheme is developed, potentially adverse effects on the aquatic biota of Cedar Creek will be mitigated.

The primary ecological impact of the project is the loss of future terrestrial biological productivity. The project has altered approximately 3,000 acres through various construction activities. Nearly 97% of the area supported some kind of vegetation, most of which has been eliminated along with the animal communities it supported.

As discussed in Section 4.4.5, the formation of the cooling pond has changed the aquatic habitat in Cedar Creek from a running water (lotic) to a standing water (lentic) environment. Leaching of inundated soils and vegetation has produced nutrient-rich water almost immediately after filling. As a result, biological productivity in the pond will be greater than in most natural lakes. The productivity may decrease as the nutrients are trapped in the pond sediments, although recent experience at several cooling ponds in Illinois indicates that productivity may remain high for longer periods than natural lakes due to the thermal input, the contributions of river makeup water, and the internal lake circulation caused by cooling water flows.

Those species which were characteristic of the riffle habitats in Cedar Creek will most likely not reproduce in the cooling pond. Most of those species which were characteristic of pool habitats in Cedar Creek will survive and produce expanding populations in the new pond. These species include the sunfishes and catfishes along with several forage species (e.g., shad and several species of shiners). The species composition of the cooling pond will depend primarily on the water quality and the faunal contributions from the stocking programs and the import of fish eggs and larvae within the

makeup water taken from the Colorado River. Since the cooling pond will probably be monomictic (Section 5.2) with thermal stratification occurring during the summer months, all but a relatively few species (e.g., of bacteria and a few invertebrates) specifically adapted to this environment will be precluded from the use of the pond's deeper areas.

The pond is likely to develop areas with beds of submergent and emergent vegetation. Such growths frequently create nuisance situations because of their excessive growth. Areas less than 10 to 15 feet in depth may contain extensive aquatic vegetation development. Chemical or mechanical weed control may be necessary in some shoreline areas to maintain recreational access.

Although the cooling pond (Section 6.4) does not have to comply with water quality standards (including temperature) for power plants, the temperatures predicted for this pond should allow for the development of a good to excellent warm water recreational fishery. Although the exact nature of the fishery cannot be predicted accurately, it is likely to contain good populations of largemouth bass, bluegill and other Lepomis species, white crappie, catfish (flathead, blue, and channel), and possibly a striped bass hydrid. All fish stocking of the pond is being done by the Texas Department of Parks and Wildlife in coordination with LCRA. The pond will also contain populations of many of the Colorado River fishes, particularly those which produce planktonic or pelagic eggs, larvae, or early stage juveniles. In addition to its development as a recreational fishery, the cooling pond will likely be utilized by large and diverse waterfowl populations. Many of these waterfowl will be seasonal residents, but nesting of some species such as mallard will likely occur.

Since there are no plant or animal species known to be endemic to the project area and the site does not provide important or critical habitat for any endangered or threatened species, the development of the site is not expected to have adverse impacts on any important biological habitats. Effects on vegetation due to air emissions also are unlikely. Anticipated emissions from the power plant of sulfur dioxide (SO_2), nitrogen dioxide (NO_2), particulate matter (PM), carbon monoxide (CO), and hydrocarbons (HC) will not approach the levels necessary for plant damage.

5.6 ARCHAEOLOGY AND HISTORY

5.6.1 Archaeological and Historic Resources of the Project Area

An examination of the files of the Texas Archaeological Research Laboratory at the University of Texas, the Balcones Research Center, and the Texas Historical Commission at Austin, and review of the National Register of Historic Places (43 FR No. 26:5310 and monthly supplements) was conducted by the staff of the Texas Archaeological Survey, University of Texas, Austin. Eighteen historic sites, structures, and properties were identified within a 10-mile radius of the Fayette Power Plant site, including three historic buildings or building complexes which were formerly situated on the power plant site (Figure 13). Several other historic sites including the Texas Independence Trail (partially in the alignment of Texas Highway 159) and a number of historic graves were also identified in the vicinity of the project.

During late summer and early autumn of 1975, an extensive literature review and archaeological reconnaissance survey of the Fayette Power Project site was conducted by the Texas Archaeological Survey of the University of Texas at Austin. The work was conducted under provisions of the Texas Antiquities Code. As a result of the survey, 31 archaeological sites (including 19 prehistoric and 12 historic and cemetery sites) were identified (Figure 14). Of the 31 sites identified during the survey, three were selected for intensive excavations and three for further tests. The sites of the historic Legler Log Cabin, Biegel-December House, and Gentner-Kroll-Polasek Farmstead were also designated for additional investigation. This research was conducted under Texas Antiquities Permit #93.

5.6.1.1 Archaeological Sites

A review of the literature pertinent to the prehistory of Fayette County, Texas indicated that very little was known about the archaeological resources of the area. The relative chronologies assumed to be applicable to the Fayette County area of Texas have been developed by comparison of typological similarities of surface finds in Fayette County with artifacts found in stratified contexts in surrounding areas. Three generalized time

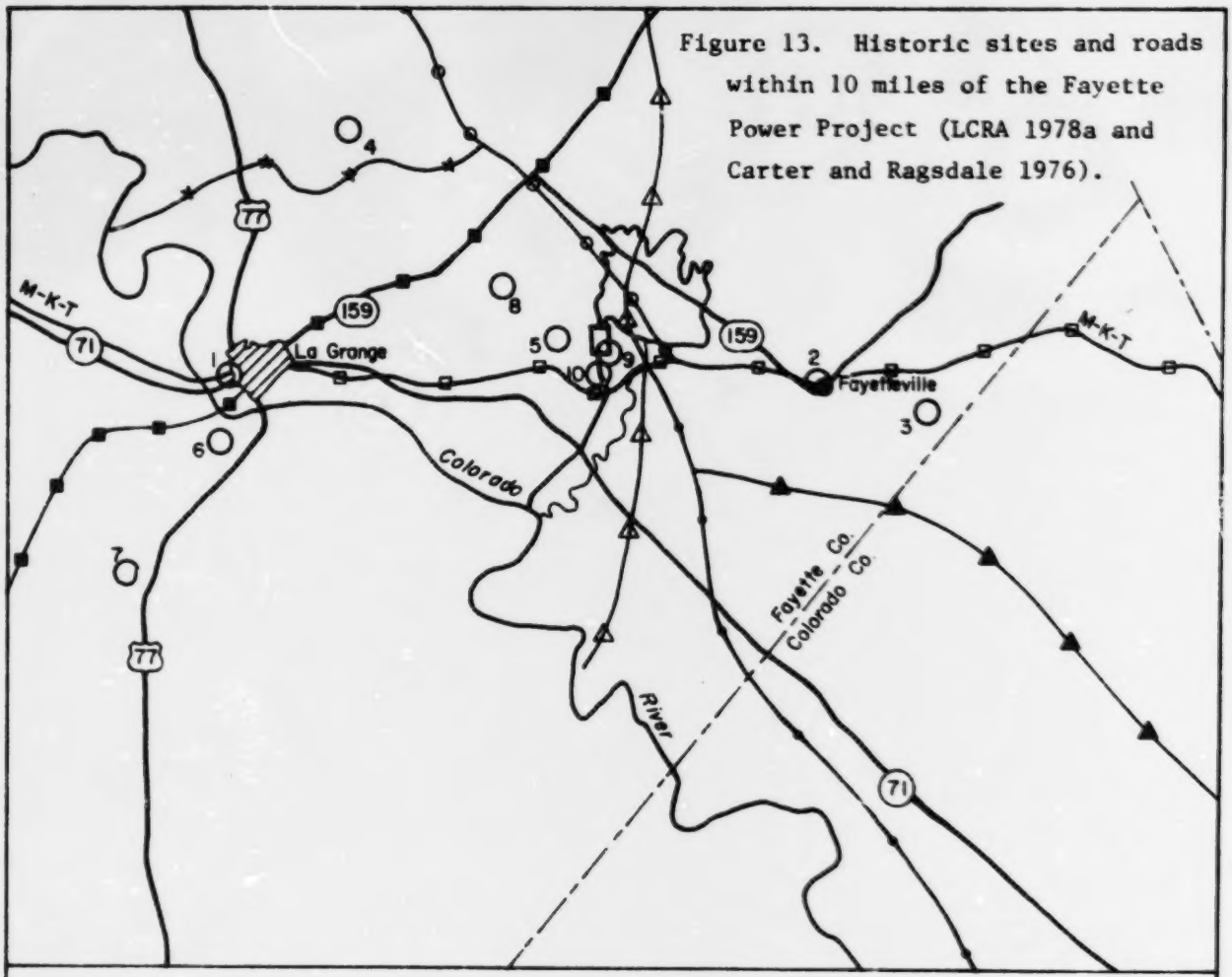


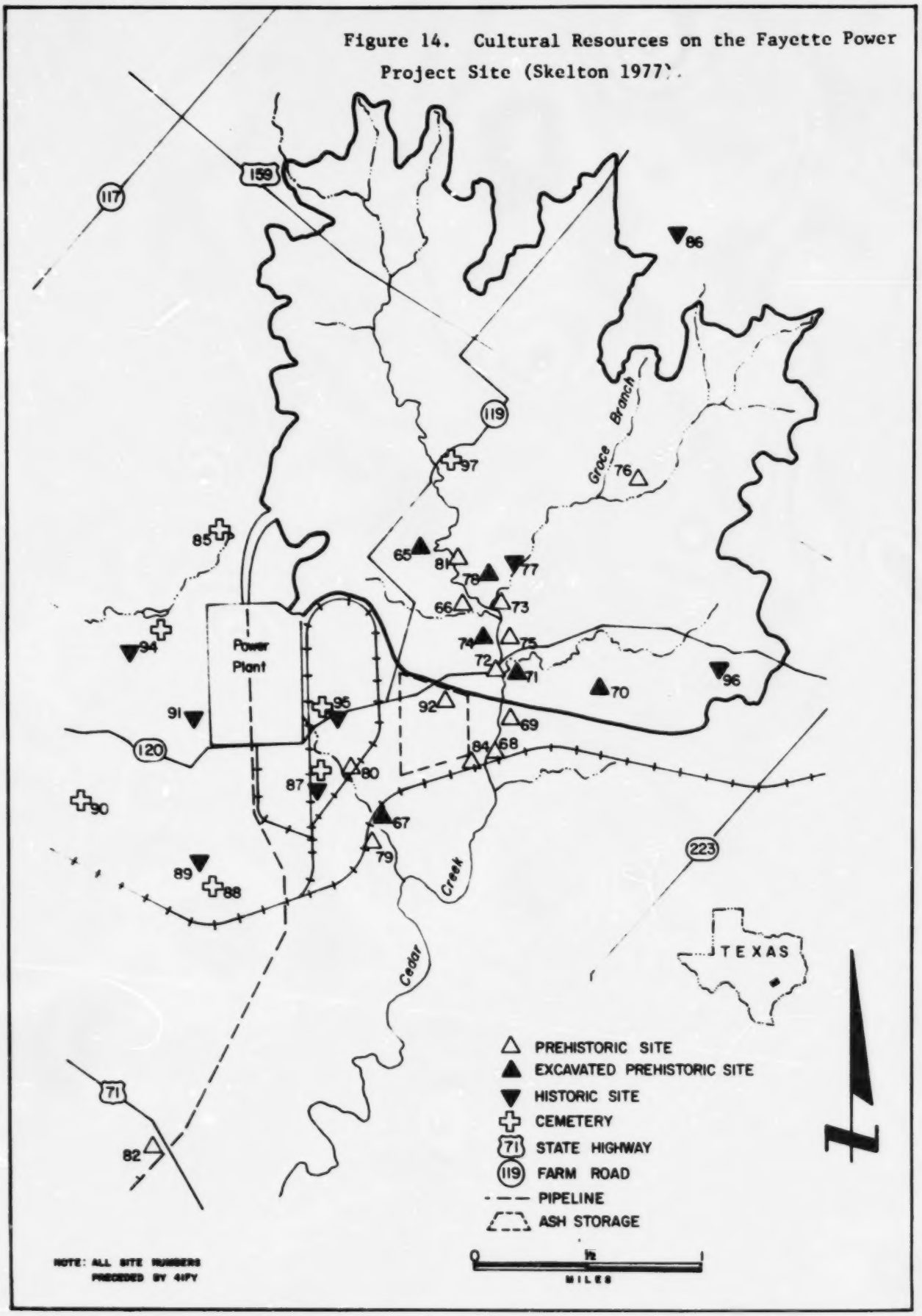
Figure 13. Historic sites and roads within 10 miles of the Fayette Power Project (LCRA 1978a and Carter and Ragsdale 1976).

Name	Location
Fayette County Courthouse (1)	City of LaGrange
First U.S. Rural Mail Route in Texas	City of LaGrange
Kaulbach Home (1)	City of LaGrange
LaGrange City Library Building (1)	City of LaGrange
N. W. Faison Home (1)	City of LaGrange
Old Masonic Lodge (1)	City of LaGrange
Site of Twin Blockhouse	City of LaGrange
St. James Episcopal Church	City of LaGrange
Travis Street Methodist Church (1)	City of LaGrange
Fayetteville City Hall (2)	Fayetteville
Fayetteville Brethren Chruch	5 miles SE of site
Home of Col. John H. Moore (4)	7 miles NW of site
Joseph Beigel Home (5)	On-site
Mier Expedition & Dawson's Men Memorial (6)	Monument Hill State Park
Oldest Czech Settlement (7)	10 miles SW of site
Rutersville College (8)	3 miles NW of site
Polasek-Kroll-Gentner Farmstead (9)	On-site
Legler Log Cabin (10)	On-site

Note: Numbers in parenthesis are keyed to the Figure.

Ross-Petius Road
La Bahia Road
Wilbarger Trace
Road to Col. John W. Moore's Homestead
San Felipe Road
Ellinger Road
Rabb Road

Figure 14. Cultural Resources on the Fayette Power Project Site (Skelton 1977).



periods have been outlined for the prehistory of the area between central and coastal Texas (Skelton 1977):

1. Paleoindian Period (ca. 9000 B.P.) - includes the first evidence of human occupation and usually refers to a hunting and gathering subsistence pattern;

2. Archaic Period (ca. 7000-1750 B.P.) - a pre-ceramic stage also associated with a technology related to an economy of hunting and gathering; and

3. Late Prehistoric Period (ca. 1250-150 B.P.) - a period of technological innovation including the introduction of ceramics, the bow and arrow, and agriculture (in some areas).

Results of the investigation of the six prehistoric sites determined by the Texas Archaeological Survey to have a potential for yielding significant information about the prehistory of Fayette County indicated the following:

- Six upland sites within the Fayette Power Plant project area were temporary intermittently occupied work camps. One bison kill site was identified. Analysis of recovered lithics, related materials, and residues of manufacture indicated that the occupants of the workshops were primarily hunters. Although flotation analysis is not complete, there is little evidence of exploitation of vegetal resources.

- The Mills site (Figure 14, No. 70) was determined to be a late Archaic lithic workshop, about 850-1750 years old.

- The Cedar Bridge site (Figure 14, No. 74) consisted of concentrations of bone, mussel shell, lithic industrial waste, ceramic shards, and one hearth spatially distributed around the partially articulated (butchered) skeleton of a bison. This apparently was a temporary kill campsite from the late Prehistoric period (ca. 150-650 B.P.).

- The Baca site (Figure 14, No. 78) yielded 27,193 lithic specimens representative typologically of stone implements manufactured during a time span of 7,000 years. The site apparently was occupied intermittently for short periods by various cultural groups between the Archaic and late Prehistoric time periods.

- Site 41FY65 (Figure 14, No. 65) was a small open campsite which could not be positively identified because of the paucity of material available for analysis. Based on typological comparison, the site appeared to be a pre-ceramic Archaic manifestation.

- Site 41FY 67 (Figure 14, No. 67) contained a cluster of five hearths related to the extraction and initial reduction of chert cobbles for tool manufacture. Two major chipped stone industries were identified at the site, which apparently was occupied repeatedly by small groups for short periods of time during which rough artifacts and preforms were prepared from locally available chert cobbles.

- Site 41 FY 71 (Figure 14, No. 71) appeared to be a small intermittently occupied Archaic tool manufacturing station where annealing processes were utilized in core reduction.

5.6.1.2 Historic Sites

The Fayette Power Project site corresponds with the 1832 settlement of Joseph and Margarethe Biegel. In 1832, the Biegels obtained a league-sized tract of land and constructed a cedar log home in the Baylor Creek drainage basin. Biegel sold parcels within his large tract, and by 1838 a small German community known as Biegel's Settlement had been established. The Biegel-December House, the Legler Log Cabin, and buildings of the Gentner-Kroll-Polasek Farmstead remained on the Settlement site until initiation of the Fayette Power Project. At that time, the Polasek farmstead included a store, a residence, a log pickle factory, a log barn, a small outbuilding, and several other structures used as chicken coops.

Archaeological excavations of these three historic sites were conducted under the Texas Antiquity Code in order to recover information about lifeways of early settlers and pioneer communities in this section of Texas. Although the historic structures were removed intact from the site, evidence of the day-to-day subsistence and technological and social developments on the site was buried in areas surrounding the structures and presumably lost as a result of plant construction.

In conjunction with the archaeological research, a program of intensive archival searches and informant interviews was conducted from which the chronology of settlement and social change in the predominantly German community was reconstructed. The sites of the Legler Log Cabin, the Biegel-December House and the Gentner-Kroll-Polasek Farmstead were selected for archaeological investigation and artifacts from these sites were collected,

catalogued, and temporarily stored, pending distribution to local museums. Researchers Carter and Ragsdale (1976) concluded later that:

> The settlement at Biegel's league grew as a group of strangers, who "treated each other as family," became, in fact, an extended family. During that period this group of people gained "Settlement" status through the social bonds they had with each other and through the device of conceptualizing the league as a bounded social unit. A number of small businesses grew up and the Kroll Store came to serve as a community center. But the people who lived there did not promote a civic or growth function for their small settlement and with (1) the advent of rural mail delivery, and (2) improved means of transportation (which reduced the need for a local general store), Biegel's Settlement ceased to function as a social reality.

5.6.2 Impacts on Archaeological and Historic Resources

In order to receive clearance for construction of the Fayette Power Project, LCRA applied to the Texas Antiquities Commission to ascertain procedural requirements for the protection of cultural resources. Under the Texas Antiquities Code provisions, the following sequence of events has occurred:

- An intensive literature review and an archaeological survey to locate both historic and prehistoric sites were conducted on the Fayette Power Project site by the Texas Archaeological Survey, University of Texas, Austin.
- A total of 31 archaeological sites was identified, of which six prehistoric sites were selected for additional tests and recovery of material.
- A total of 18 historic sites were identified within a 10 mile radius of the site, including three buildings on the Power Plant site.
- Complete reports of the investigations, conducted under Antiquities Permit No. 93, were prepared. These reports, entitled Biegel Settlement: Historic Sites Research, Fayette Power Project, by Emily Suzanne Carter and Crystal Sasse Ragsdale, and Archaeological Investigations at the Fayette Power Project, Fayette County, Texas, by Duford W. Skelton, were submitted to the Lower Colorado River Authority by the Texas Archaeological Survey, during 1976 and 1977 respectively.

- Structures from three historic sites were removed intact from the site. The Biegel-December House, a Texas State Historical Landmark, determined by investigators to satisfy criteria of eligibility for the National Register of Historic Places, was removed to the Winedale Inn Historical Complex (owned and operated by the University of Texas). The Historical Complex is presently listed on the National Register of Historic Places. The Legler Log House was carefully disassembled and removed to Winedale Inn Historical Complex, where it is presently in storage. Structures on the Gentner-Kroll-Polasek Farmstead, also determined to be eligible for the National Register, were sold to private individuals or concerns and removed from the site. The Kroll Store was purchased by Allen Pagel and removed intact to his land near Fayetteville. The original separate kitchen on the site was moved to Henkel Square in Round Top, Texas, and the pickle factory and barn were purchased by Mrs. Emma Lee Turney and moved to Warrenton, Texas (Carter and Ragsdale 1976).

- The architectural details of those structures removed to the Winedale Inn Historical Complex Museum were recorded and complete sets of measured drawings and photographs were prepared (By phone, Ms. Jaspers, Winedale Inn Historical Complex, 2 November 1978).

- In the opinion of Dr. David Dibble, Director, Texas Archaeological Survey, as much information as could feasibly be obtained was collected from the Fayette Power Project site and adequate mitigation of adverse effects of plant construction and/or operation on historical and cultural resources was provided by the research (By phone, Dr. David Dibble, Director, Texas Archaeological Survey, 26 October 1978).

Information from the archaeological sites (as discussed in Section 5.6.1.1) was collected, evaluated, and thoroughly documented; three historic sites meeting the criteria for eligibility for nomination to the National Register of Historic Places were removed intact; and two of the three historic structures were architecturally evaluated and recorded. Adverse impacts from the project on cultural and historic resources have been mitigated through these actions. Furthermore, it was determined that there would be no or minimal adverse visual effect on historic places within a 10-mile radius of the project site (By phone, Dr. David Dibble, Director, Texas Archaeological Survey, 26 October 1978). In accordance with their regulations, the Advisory Council on Historic Preservation will be afforded the opportunity to comment on the cultural resources preservation work undertaken on this project.

5.7 SOCIOECONOMICS

The evaluation of socioeconomic characteristics includes those areas within the general vicinity of the plant site (10 mile radius) and the significant population centers (within 30 miles) that might be affected by the facility. These areas are indicated in Figure 1. No major socioeconomic impacts are anticipated from project operation.

5.7.1 Land Use

5.7.1.1 Existing Land Use

Existing land use in the vicinity of the Fayette Power Project was evaluated for agricultural, recreational, industrial, and other major planned developments. Agriculture is the primary economic activity in Fayette County and the majority of the land area is used for the production of livestock and crops. Although no acreage total was calculated for the general vicinity of the project area, it is estimated that 90% of the land area is in agricultural use of some type. Major crops include hay, corn, peanuts, cotton, wheat, and oats.

Most of the existing and planned recreational areas in the project area are located in or near La Grange with the exception of LCRA's planned facility. Currently, there are approximately 50 acres of recreational open space within 10 miles of the project with an additional 76.4 acres proposed to be added by 1980. This total will exceed the Capital Area Planning Council's recommended standard of 10 acres per 1,000 urban population. LCRA's recreational development on-site will open in June 1979 and be fully completed during late 1979. The 195 acre site will include facilities for picnicking, boating, fishing, and camping.

Industrial activities within 10 miles of the Fayette Power Project are located largely around La Grange. These activities include the production of sawmill products, beams, prefabricated trucks, cattle guards, feed mill products, gravel products, glass, mattresses, cemetery monuments,

custom furniture, wooden fences, farm equipment, and machine works. The small size of these industrial operations accounts for the relatively low total employment figure of 200 to 250 persons.

Planned urban and rural developments within 30 miles of the site are generally small and associated with the natural expansion of the surrounding communities. One subdivision (30 acres) near Bellville has recently been built as were two major industrial sites near Columbus and Weimar. These two industries employ approximately 800 people. Several other industries have also announced their intention to build in the area in the near future. Other planned development consists of park and recreation acquisitions and development.

5.7.1.2 Prime and Unique Farmlands

Prime farmland as defined by the U.S. Department of Agriculture (7 CFR Part 657) includes land that has the soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops when treated and managed. Information from the U.S. Soil Conservation Service, La Grange, Texas and Temple, Texas Field Offices indicates that approximately 23.3% (700 acres) of the 3,000 acre project site is classifiable as prime farmlands (Figure 8). This interpretation is based on the presence of three soil types (Heiden clay, Houston-Black clay, and Heiden gravel-clay) found on the project site which exhibit the characteristics necessary for prime farmland (SCS 1978). An analysis of the location of these soils reveals that only 3% (21 acres) of this prime farmland was used for crop production prior to cooling pond and plant construction.

5.7.2 Population Center Characteristics

5.7.2.1 Existing Socioeconomic Characteristics

Population, economic, and public service characteristics of the population centers were evaluated for 11 communities within 30 miles of the project site. The key characteristics of each center are summarized in Table 32. Generally, the following observations characterize the socio-

Table 32. Population, economic, and public service characteristics of population centers in the vicinity of the Fayette Power Project.

Community	Distance from site (miles)	1975 Population	Housing availability	Motel Units	Major occupation[1]	Skilled labor availability	Retail sales (million $)	School enrollment (% of capacity)	Utilities[2]	Full-time police officers	# of fire protection personnel[3]	hospital bed capacity
Bastrop	36	3,100	limited	60	A	limited	4.6	100%	All	3	45	25
Bellville	30	3,000	very limited	40	A,S	limited	6.3	90%	All	3	30	40
Brenham	27	8,700	rental limited	137	M,C	limited	2.8	90%	T,G,W,E	NA	81	60
Columbus	19	3,300	rental available	212	M	available	9.4	75%	All	4	35	38
Fayetteville	5	400	no rental	0	A	none	.7	70%	T,W,S,E	2	25	none
Flatonia	26	1,000	very limited	12	A	limited	2.6	90%	T,W,S,E	3	30	none
Giddings	21	2,700	limited	50	A	limited	8.1	85%	All	4	32	32
La Grange	7	2,900	limited	85	A,R,W	limited	11.4	70%	All	3	NA	60
Schulenberg	19	2,300	very limited	24	M	limited	6.7	100%	All	5	45	none
Smithville	25	2,900	rental limited	12	M,O,C	some	4.0	105%	All	4	35	25
Weimar	15	2,100	limited	15	A,S	limited	4.8	80%	All	4	NA	36 beds

[1] A - agriculture, S - service, R - retail trade, W - wholesale trade, M - manufacturing, C - construction, O - operation.

[2] G - natural gas, W - water, S - sewer, E - electricity, T - telephone.

[3] All fire departments are volunteer with the exception of Brenham which has 6 full-time personnel.

SOURCE: Condensed from Lower Colorado River Authority. 1978. Environmental assessment of the Fayette Power Project. Volume 3. Appendix C. Austin TX.

economic environment in the vicinity of the project:

- The existing and projected socioeconomic setting in the vicinity of the site is generally rural.
- Rural housing within 30 miles of the Fayette Power Project is limited. However, several mobile home parks are under construction.
- Local skilled construction labor currently just meets the needs of the region.
- Most schools are operated at less than capacity and could accommodate the effects of additional population expansion.
- The major occupation in the project vicinity is agriculture.
- Public services and utilities in the project vicinity are generally adequate to meet current and projected needs.
- Temporary housing (motel units) are readily available within 30 miles of the plant site.
- The economic base of the project area is composed of limited industrial activity and moderate retail trade.

Within ten miles of the site, the population is estimated to be approximately 6,691 people, 50% of which lies in the three major population centers of La Grange, Ellinger, and Fayetteville.

5.7.2.2 Population Center Trends and Projections

The rural character of most of the area within 10 and 30 miles of the Fayette Power Project is not conducive to major growth during the next 30 years. Population projections prepared by the Office of the Governor, Office of Information Services, indicates that population growth in Fayette County, the ten mile project area, and in the population centers during the operational lifetime of the project (through 2010) will generally decrease under existing conditions. As indicated in Table 33, the project area and Fayette County as well as five of the population centers are projected to incur population decreases by the year 2010. This decreasing trend is projected as a result of continued lower birthrates and limited migration into the project area. The low projected population growth in the area is also anticipated to result in minimal levels of urban development.

Table 33. Population by project area, county, and population center in the vicinity of the Fayette Power Project, 1975 - 2010.

Area	1975 Population	1980 Population	1990 Population	2000 Population	2010 Population	Percent Change 1975 - 2010
Project Area	6,691	6,270	5,779	5,643	5,721	-14.5%
Fayette County	16,583	15,477	14,181	13,772	13,901	-16.2%
Bastrop	3,099	3,086	3,226	3,553	4,033	+30.1%
Bellville	2,337	2,303	2,325	2,456	2,667	+14.1%
Brenham	8,762	8,602	8,670	9,085	9,699	+10.7%
Columbus	3,337	3,333	3,455	3,722	4,063	+21.7%
Fayetteville	376	351	322	313	316	-16.0%
Flatonia	1,034	966	885	859	867	-16.0%
Giddings	2,671	2,559	2,472	2,519	2,633	- 1.4%
La Grange	2,918	2,727	2,499	2,427	2,450	-16.0%
Schulenberg	2,288	2,138	1,959	1,902	1,920	-16.1%
Smithville	2,946	2,934	3,067	3,378	3,834	+30.1%
Weimar	2,101	2,098	2,175	2,343	2,558	+21.8%

SOURCE: Texas Office of Information Services. 1975. Population projections for Texas counties from "POPPROJ" program. Office of the Governor, Division of Planning Coordination. Austin TX.

5.7.3 Transportation and Traffic

5.7.3.1 Highways

The area in the vicinity of the Fayette Power Project is traversed by four major highway routes: (1) U.S. Highway 77; (2) Texas Highway 71; (3) Texas Highway 159; and (4) Texas Highway 237 (Figure 1). Highway 71 is located two miles south of the project site and is the primary route used by the labor force and for equipment deliveries to the site. This highway has been recently improved by the State Department of Highways and Public Transportation and is expected to be expanded to a four-lane divided highway in the near future.

Highway 159 connects La Grange with Fayetteville north of the cooling pond. Approximately five miles of this road was relocated due to the location of the cooling pond. This relocation was paid for by LCRA.

5.7.3.2 Railroads

The Missouri-Kansas and Texas Railroad is located one mile south of the site. The construction of a spur line and a rail loop on site will allow the railroad to serve as the means of delivering coal to the power plant from Wyoming and Montana. Currently, rail traffic consists of an average of four trains per day in each direction, reaching a high of 12 trains per day in each direction during grain harvest season. No other public transportation is available within the project area. Approximately 20 public and private airports and landing strips are located within 30 miles of the plant site to service small private aircraft.

5.7.4 Impacts on Socioeconomics

The conversion of approximately 3,000 acres of pasture and agricultural land to an industrial use has reduced agricultural productivity in Fayette County by only a small percentage. This is due to the small number of cattle raised and crops produced on the site prior to construction, and to

the small percentage of prime farmlands taken out of production. As the 2,400 acre cooling pond is developed for recreational use according to the LCRA master plan, it will represent a much needed recreational resource in the project area. No significant secondary growth impacts are anticipated from project construction and operation.

The 7,500 acres (3,000 acres for Units 1 and 2, 4,500 acres for future expansion) purchased for the Fayette Power Project have been removed from the County tax rolls. This tax loss represents a small annual loss of property taxes ($3,400) to Fayette County and of school taxes ($10,500) to the La Grange and Fayetteville School Districts which will continue throughout the life of the project. The property tax losses will be offset, however, by increased sales tax revenues derived from retail and wholesale sales of electric power. This increase in sales tax is estimated to amount to $5.7 million per year for the County and the City of Austin.

The number of construction workers on the project has peaked on a short-term basis at approximately 889 people, increasing the population in the project area by an estimated 600 to 800 people including 85 to 135 school age children. As construction work is completed on Unit 1, the number of construction workers will decrease to approximately 300 workers while the number of operating employees increases from the current level of 108. When Unit 2 is completed, a peak full-time operating labor force of 230 employees will be on-site. These operating employees are anticipated to reside within the 30 mile impact area. Assuming that each employee is the head of a household (average household size of 3.17 persons), the projected permanent population increase in the project area will be 730 people including approximately 135 school age children.

In addition to the job opportunities generated directly by the construction and operation of the plant, there has been and will continue to be induced secondary employment opportunities resulting from increased incomes and spending in the project area. The peak level of nearly 460 induced employment opportunities during 1978 will decrease to approximately 327 permanent jobs as project construction is completed and the plant becomes fully operational (Table 34). These induced jobs will occur largely in

Table 34. Estimated levels of direct and induced employment resulting from construction and operation of the Fayette Power Project.

	1975	1976	1977	1978	1979	1980	1981	1982	1983 and Subsequent Years
Construction Employment									
Direct(1)	48	179	241	292	109	45	0	0	0
Induced	38	215	316	401	260	64	10	4	0
Subtotal	86	394	557	693	369	109	10	4	0
Operating Employment									
Direct	0	0	0	108	176	224	230	230	230
Induced	0	0	0	58	193	279	319	327	327
Subtotal	0	0	0	166	369	503	549	557	557
Total Direct and Induced Employment									
Direct	48	179	241	400	285	269	230	230	230
Induced	38	215	316	459	453	343	329	331	327
TOTAL	86	394	557	859	738	612	559	561	557

(1) Figures are averages of quarterly levels of employment.

SOURCE: Lower Colorado River Authority. 1978. Environmental assessment of the Fayette Power Project. Volume 1. Austin TX. p. 4-24.

the service, retail trade, and transportation sectors.

The income generated during plant operation from wages and expenditures will be of a long-term continuing nature, amounting to an annual increase in disposable income of $1,973,600 from operating employees and $2,802,500 from induced labor. Total disposable income resulting from project operation over the 30 year operating life of the plant is estimated at over $152 million, most of which will be spent in the project area.

Housing, services, and facilities in the project area have adequately accommodated the temporary increase in population resulting from construction and are anticipated to satisfactorily meet the demand generated by new permanent residents.

Texas Highway 77 has and will continue to handle higher volumes of traffic resulting from labor force commuting trips and plant deliveries and servicing. However, planned improvement of this highway to four lanes should alleviate any anticipated traffic problems. Increased rail traffic of four to five trains per week each way may obstruct at-grade rail crossings and will increase the potential for accidents in the project area.

5.8 TRANSMISSION LINES

5.8.1 Existing Conditions

The three major segments of the proposed transmission lines will be located primarily within Fayette and Bastrop Counties. The route extending west from the plant to Austrop substation will also pass through small sections of Lee and Travis Counties, and the route extending west from the plant to the Lytton Springs substation will pass through a portion of Caldwell County (Figure 5).

The land areas crossed by the three major segments of transmission line corridor are typical of those in the general vicinity of the plant site. No urban land uses, known historic or archaeological sites, or recreational areas lie in the corridor route. The major land use trend in these areas has been the conversion of forest and rangelands to pasture. Farming and

ranching activities have altered much of the natural habitat, but cropland acreage has decreased since 1958. Generally, the transmission line routes traverse rural areas which are primarily uninhabited. Approximately 80 road and 19 river and stream crossings will be necessary. No listed major or historic springs are located in the corridor routes.

The three major segments of transmission line corridor from the plant represent 121 miles of corridor of which 80.5 miles will be new corridor and 40.5 miles will be widened existing corridor. The construction of the lines in these corridors will be carried out by completely clearing a narrow strip on either side of the centerline of the transmission line. Selected areas of river banks will also be cleared to allow for maintenance of the lines. With the exception of the land occupied by the transmission tower bases, landowners will be free to use all available land within the transmission line right-of-way as long as no safety hazard is created.

The soil types that underlay the transmission corridor in Fayette County are similar to those found on the project site (Section 5.1.3). The corridor also traverses the northwest portion of Fayette County and the southern tip of Lee County which have soils of the Lufkin-Axtell-Tabor Association (alkaline marine and alluvial clayey sediments). Other soil types found in the transmission corridor include a series of north-south bands in Bastrop County of the Lufkin-Axtell-Tabor, Patilo-Stidham (sandy to clayey acid to alkaline sediments), and Wilson-Crockett-Burleson Associations (alkaline marine and alluvial clayey sediments); the Houston-Black-Heiden-Austin Association (marine snarls and chalks) in eastern Travis County; and the Wilson-Crockett-Burleson and Houston-Black-Heiden-Austin Associations in northern Caldwell County.

5.8.2 Impacts of Transmission Lines

Clearing and construction activities related to transmission line construction are expected to have minimal effects on topography, hydrology or biology. An unavoidable increase in erosion will result and temporary disturbance of faunal habitats may destroy some plant and animal species.

Based on existing information concerning the routes and the vegetational characteristics of the surrounding areas, it is unlikely that significant or unusual vegetation will be impacted by corridor construction. The opening of woodlands cleared for the transmission corridors will be beneficial for many species, particularly the important game animals such as deer, rabbit, bobwhite, and mourning doves. Revegetation measures in the corridors should not only minimize erosion, but also increase habitat diversity and nesting sites in the project area for existing and new species. Adverse impacts to aquatic biota will be avoided since erosion and stream bank disturbance will be minimized through appropriate revegetation measures.

The construction schedule for the transmission lines allows adequate lead time for scheduling construction activities to avoid crop harvesting. The tower structures will remove approximately six acres from farming and may marginally interfere with farming activities, but the lines will not remove land from productive use. However, only non-structural uses will be permitted in the right-of-way. The undesirable aesthetic effect of the lines will be minimized where possible by using existing corridors. Right-of-way maintenance will be performed with brush killer and by shredding, creating some short-term negative impacts on broadleaved plants.

6.0 COORDINATION

6.1 PUBLIC PARTICIPATION

The Notice of Intent which was distributed to State and local agencies and other interested parties on 27 July 1978 resulted in letters from the Federal Energy Regulatory Commission, the Advisory Council on Historic Preservation, the Texas Antiquities Committee, and the Soil Conservation Service. Copies of these letters are included at the end of this section.

The DEIS will be available for public review and comment for 45 days. All local, State, and Federal agencies, private citizens, and interested environmental groups will have an opportunity during this review period to provide comments to USEPA. Depending upon the nature and extent of the comments received, USEPA will determine if a formal public hearing is warranted. At the close of the public review period, all comments will be reviewed by USEPA. Comments of a pertinent and substantial nature will be incorporated into the final EIS along with appropriate and definitive responses. Any revisions to the DEIS necessary as a response to comments will be made and noted in the final EIS.

6.2 LCRA PROJECT COORDINATION

Numerous public and private meetings were held by LCRA during the planning and initial construction phases of the Fayette Power Project. These meetings addressed the need for power, the choice of fuel, the site selection process, the power plant facilities, and the pollution abatement measures to be used. In addition, public hearings on the relocation of State Highway 159 and the control of air pollution at the project have been held. All relevant suggestions and objections raised at these meetings have been made and addressed in LCRA's Environmental Assessment and are incorporated in the DEIS.

6.3 PERMITS AND APPROVALS

In addition to the New Source NPDES permit, the Fayette Power Project has been subject to a number of other Federal and State permit and approval

actions. To date, most of these actions have taken place and are briefly summarized below.

6.3.1 Other Federal Requirements

Environmental Protection Agency

- Approved application and designated Cedar Creek impoundment as a "cooling pond."
- Approved design intake water velocities at pumping plant and at cooling water intakes for Units 1 and 2.
- Issued Prevention of Significant Air Quality Deterioration approval for Unit 2.

Federal Aviation Administration

- Approved chimney heights and lighting facilities for Units 1 and 2.

Federal Energy Administration

- Issued Construction Order for Units 1 and 2.

US Army Corps of Engineers

- Issued Section 10 permit to construct a river intake pumping station. (Note: In process of obtaining above Section 10 pumping plant permit, approvals of project had to be obtained from U.S. Fish and Wildlife Service and National Marine Fisheries Services, both Federal agencies.)
- Waived Section 404 Permit requirement for Cedar Creek Dam.

6.3.2 Other State Requirements

Texas Air Control Board

- Issued construction permit for Unit 1 and Unit 2 boiler, precipitator, and chimney.
- Issued permit for dust suppression control on coal handling for Units 1 and 2.
- Operating permit to be applied for within 30 days after first day of operation.

Texas Parks and Wildlife Department

- Issued permit for removal of sand and gravel from river bed and banks during construction of pumping plant.
- Developed tree clearing plan for Cedar Creek Pond in order to make it suitable as a fish habitat.

Texas Railroad Commission

- Granted waivers of railcar clearances at rotary car dumper and loading docks.

Texas State Building Commission

- Approved design of the power station's central administrative warehouse and shop facilities for handicapped persons.

Texas Historical Commission

- Issued Archeological Permit requiring investigation and mitigation of artifacts.
- Issued Antiquities Permit requiring recording and preservation of historical buildings and sites.

Texas Water Rights Commission (Texas Department of Water Resources)

- Issued construction permit for Cedar Creek and Baylor Creek dams and reservoirs to provide cooling capacity for 3,000 MWe or four units.
- Approved appropriation of waters from both creeks and authorization of diversion from Colorado River for total project.
- Approved Water Quality Waste Control Order and Industrial Solid Waste Disposal Site (ash disposal).

Texas Water Quality Boards (Texas Department of Water Resources)

- Issued a certification that construction of river pumping plant would not violate Texas Water Quality Standards.
- Issued a Waste Control Permit for site run-off during construction of dam, reservoir, roads, railroads, and power plant block for Units 1 and 2.

6.4 CORRESPONDENCE

Attached to this section is the correspondence referenced in this document.

FEDERAL ENERGY REGULATORY COMMISSION

REGIONAL OFFICE

819 Taylor Street
Fort Worth, Texas 76102

July 28, 1978

Mr. Clinton B. Spotts
Regional EIS Coordinator
United States Environmental Protection Agency
Region VI
1201 Elm Street
Dallas, Texas 75270

Dear Mr. Spotts:

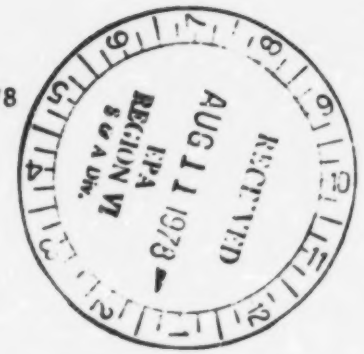
We have received the Notice of Intent to prepare an environmental impact statement for the Fayette Power Project being constructed by the Lower Colorado River Authority. We will wish to comment on the EIS with particular respect to the need for electrical power in the area.

Sincerely yours,

Lenard B. Young

Lenard B. Young
Regional Engineer

Advisory Council on
Historic Preservation
1522 K Street N.W.
Washington, D.C. 20005



August 8, 1978

Mr. Clinton B. Spotts
Regional EIS Coordinator, Region VI
U.S. Environmental Protection Agency
1201 Elm Street
Dallas, Texas 75270

Dear Mr. Spotts:

This is in response to Adlene Harrison's July 27, 1978, notice of intent to prepare an environmental impact statement for a New Source National Pollutant Discharge Elimination System permit to discharge wastewater from their proposed two-unit coal-fired steam electric generating station, the Fayette Power Project, into Cedar Creek and eventually into the Colorado River, Fayette County, Texas.

As part of its planning process the Environmental Protection Agency should arrange to have the areas to be impacted by the undertaking surveyed to identify cultural properties eligible for inclusion in the National Register of Historic Places. After the survey is complete, if EPA determines, in consultation with the Texas State Historic Preservation Officer, that the undertaking will result in an effect on any property included in or eligible for inclusion in the National Register it is required to afford the Council an opportunity to comment on the undertaking pursuant to Section 106 of the National Historic Preservation Act of 1966 (16 U.S.C. 470f, as amended, 90 Stat. 1320) in accordance with the "Procedures for the Protection of Historic and Cultural Properties" (36 CFR Part 800).

Subsequently, the environmental statement prepared for the undertaking should assess its impact on historic and cultural resources. If any of these properties are included in or eligible for inclusion in the National Register the environmental documentation should demonstrate contact with the Council and include a copy of its comments. Should you have questions or require additional assistance in this matter, please contact Michael H. Bureman of the Council staff at P. O. Box 25085, Denver, Colorado 80225, or at (303) 234-4946, an FTS number.

Sincerely yours,

Louis S. Wall
Assistant Director, Office of
Review and Compliance, Denver

The Council is an independent unit of the Executive Branch of the Federal Government charged by the Act of October 15, 1966 to advise the President and Congress in the field of Historic Preservation.

Texas Antiquities Committee
Box 12276, Capitol Station Austin, Texas 78711

DR. FRED WENDORF
TRUETT LATIMER
BOB ARMSTRONG
HENRY B. BURKETT
DR. W.C. HOLDEN
DR. WILLIAM G. REEDER
CURTIS TUNNELL

RECEIVED
OCT 4 1978
EPA
REGION VI
ARM

October 2, 1978

Mr. Clinton B. Spotts
Regional EIS Coordinator
United States Environmental Protection Agency
Region VI
1201 Elm Street
Dallas, Texas 75270

Dear Mr. Spotts,

The Texas Antiquities Committee requests a copy of the EIS as prepared for the Lower Colorado River Authority, LCRA; Fayette Power Project, concerning wastewater discharge as outlined in your letter of July 27, 1978.

Sincerely,

LaVerne Herrington
Archeologist
Cultural Resource Division

LH/cr

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
P. O. Box 648
Temple, TX 76501

August 29, 1978

Mrs. Adlene Harrison
Regional Administrator (6A)
United States Environmental Protection Agency
1201 Elm Street
Dallas, TX 75270

Dear Mrs. Harrison:

We have read the Notice of Intent to prepare an environmental impact statement by the Lower Colorado River Authority for a New Source National Pollutant Discharge Elimination System (NPDES) permit for wastewater discharge into Cedar Creek, Fayette County, Texas. In prpearation of the impact statement, consideration should be given to the planning of erosion control measures that will minimize erosion.

We would appreciate the opportunity of reviewing the statement after it has been developed.

Sincerely,

George C. Marks
State Conservationist

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VI
1600 PATTERSON
DALLAS, TEXAS 75201

July 15, 1975

Colonel Don S. McCoy
District Engineer
Galveston District
U. S. Corps of Engineers
P. O. Box 1229
Galveston, Texas 77550

Dear Colonel McCoy;

The Environmental Protection Agency has reviewed the Public Notice for Permit 10766, dated June 16, 1975. The applicant, the Lower Colorado River Authority, proposes to construct a pumping plant intake structure on the Colorado River near LaGrange, Texas. This pumping plant is to be operated in conjunction with a proposed fossil fuel generating facility located on Cedar Creek.

The intake structure design, as proposed by the applicant, will comply with the requirements of Section 316(b) of PL 92-500. Maximum intake velocity will be 0.6 fps, with an expected velocity during reservoir filling of 0.41 fps.

The proposed fossil fuel generating station has been determined to be a new source for the purpose of Section 511 of PL 92-500. The applicant is presently preparing an Environmental Assessment, upon which we will base our decision as to whether issuance of an NPDES permit for discharges from the proposed facility will require the preparation of an Environmental Impact Statement. Although this environmental review process is not yet complete, we will not object to the issuance of the Section 10/404 permit at this time. However, we are advising the applicant, by copy of this letter, that should they wish to proceed with construction before completion of our environmental review, they do so at their own risk.

Sincerely yours,

David N. Peters

David N. Peters
Acting Chief,
Project Assessment Section (6EP)

cc: Mr. John E. Babcock
Director of Environmental Resources
Lower Colorado River Authority
P. O. Box 220
Austin, Texas 78767

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ENVIRONMENTAL PROTECTION AGENCY

SEP 25 1975

Mr. John E. Babcock, Director
Environmental Resources
Lower Colorado River Authority
P. O. Box 220
Austin, Texas 78767

Re: Cedar Creek Reservoir

Dear Mr. Babcock:

We have reviewed the information which you provided in your letter of September 23, 1975, relative to the proposed Cedar Creek Reservoir of the Fayette Power Project. Based on our interpretation of the information provided, it is our determination that Cedar Creek Reservoir will qualify as a "cooling pond" under current regulations, dated October 8, 1974, for "Steam Electric Power Generating Point Source Category."

If additional information is needed, please contact Fred Humke or Dave Peters in the Region VI Enforcement Division, telephone 214/749-1983.

Sincerely yours,

ORIGINAL SIGNED BY

Robert B. Elliott, Chief
Permits & Support Branch

9-24-75

9/24/75

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127

CONCURRENCES

SYMBOL		6AEP						
SURNAME		Peters						
DATE		DAFT 9/24/75						

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APPENDIX A

DRAFT NPDES PERMIT

Permit No. TX0073121
Application No. TX0073121

AUTHORIZATION TO DISCHARGE UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Federal Water Pollution Control Act, as amended, (33 U.S.C. 1251 et. seq; the "Act"),

Lower Colorado River Authority
P. O. Box 220
Austin, Texas 78767

is authorized to discharge from a facility located at

Fayette Power Project
La Grange, Fayette County, Texas

to receiving waters named

Cedar Creek, thence into the
Colorado River Basin

in accordance with effluent limitations, monitoring requirements and other conditions set forth in Parts I, II, and III hereof.

This permit shall become effective on

This permit and the authorization to discharge shall expire at midnight,

Signed this day of

Howard G. Bergman
Director
Enforcement Division (6AE)

A- 1 **EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS**

During the period beginning effective date and lasting through expiration date
the permittee is authorized to discharge from outfall(s) serial number(s) 001 reservoir blowdown.

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations				Monitoring Requirements	
	kg/day (lbs/day)		Other Units (Specify)			
	Daily Avg	Daily Max	Daily Avg	Daily Max	Measurement Frequency	Sample Type
Flow—m^3/Day (MGD)	N/A	N/A	(*)	(*)	Continuous	Record
Temperature, degrees	N/A	N/A	*^oC(^oF)***	35.0^oC(95^oF)**	Continuous	Record

* Report
** Instantaneous Maximum
*** See Part III, Paragraph C.

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored 1/week by grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s):
At Outfall 001 where Cedar Creek reservoir discharges from a 9 foot diameter conduit to Cedar Creek.

A2

A3

A- 2 **EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS**

During the period beginning effective date and lasting through expiration date
the permittee is authorized to discharge from outfall(s) serial number(s) 101, recirculating cooling water.

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations kg/day (lbs/day) Daily Avg	Daily Max	Other Units (Specify) Daily Avg	Daily Max	Monitoring Requirements Measurement Frequency	Sample Type
Flow m^3/Day (MGD)	N/A	N/A	(*)	(*)	1/day	Calculated
Temperature, degrees	N/A	N/A	C(*F)	C(*F)	1/day	In Situ
Free Available Chlorine**	N/A	N/A	0.2 mg/1	0.5 mg/1	1/week***	Grab

* Report
** See Part III
*** Samples shall be representative of periods of chlorination.

The pH shall not be less than N/A standard units nor greater than N/A standard units and shall be monitored N/A.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s):
At Outfall 101 where recirculating cooling water discharges from the canal into Cedar Creek Reservoir.

PART I
Page 3 of 14
Permit No. TX0073121

A5

A 4 **EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS**

During the period beginning effective date and lasting through expiration date
the permittee is authorized to discharge from outfall(s) serial number(s) 003 area runoff water.**

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations kg/day (lbs/day)		Discharge Limitations Other Units (Specify)		Monitoring Requirements Measurement Frequency	Monitoring Requirements Sample Type
	Daily Avg	Daily Max	Daily Avg	Daily Max		
Flow—m^3/Day (MGD)	N/A	N/A	(*)	N/A	1/occurrence***	Estimate
Total Suspended Solids	N/A	N/A	40 mg/l	50 mg/l	1/occurrence***	Grab

* Report
** See Part III, Paragraph G.
*** Samples shall be taken once during each occurrence or once every 24 hours if duration of occurrence is greater than 24 hours.

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored 1/occurrence*** by grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): At Outfall 003 where area runoff water is discharged from the coal storage runoff retention pond prior to mixing with any other waste stream and prior to entry to Cedar Creek.

B. SCHEDULE OF COMPLIANCE

1. The permittee shall achieve compliance with the effluent limitations specified for discharges in accordance with the following schedule:

None

2. No later than 14 calendar days following a date identified in the above schedule of compliance, the permittee shall submit either a report of progress or, in the case of specific actions being required by identified dates, a written notice of compliance or noncompliance. In the latter case, the notice shall include the cause of noncompliance, any remedial actions taken, and the probability of meeting the next scheduled requirement.

C. MONITORING AND REPORTING

1. *Representative Sampling*

Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge.

2. *Reporting*

Monitoring results obtained during the previous 12 months shall be summarized for each month and reported on a Discharge Monitoring Report Form (EPA No. 3320-1), postmarked no later than the 28th day of the month following the completed reporting period. The first report is due on . Duplicate signed copies of these, and all other reports required herein, shall be submitted to the Regional Administrator and the State at the following addresses:

Mr. Howard G. Beroman, Director
Enforcement Division
Environmental Protection Agency
First International Building
1201 Elm Street
Dallas, Texas 75270

Mr. Harvey D. Davis
Executive Director
Texas Department of Water Resources
P. O. Box 13087
Capitol Station
Austin, Texas 78711

3. *Definitions*

a. The "daily average" discharge means the total discharge by weight during a calendar month divided by the number of days in the month that the production or commercial facility was operating. Where less than daily sampling is required by this permit, the daily average discharge shall be determined by the summation of all the measured daily discharges by weight divided by the number of days during the calendar month when the measurements were made.

b. The "daily maximum" discharge means the total discharge by weight during any calendar day.

4. *Test Procedures*

Test procedures for the analysis of pollutants shall conform to regulations published

5. Recording of Results

For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information:

a. The exact place, date, and time of sampling;

b. The dates the analyses were performed;

c. The person(s) who performed the analyses;

d. The analytical techniques or methods used; and

e. The results of all required analyses.

6. *Additional Monitoring by Permittee*

If the permittee monitors any pollutant at the location(s) designated herein more frequently than required by this permit, using approved analytical methods as specified above, the results of such monitoring shall be included in the calculation and reporting of the values required in the Discharge Monitoring Report Form (EPA No. 3320-1). Such increased frequency shall also be indicated.

7. *Records Retention*

All records and information resulting from the monitoring activities required by this permit including all records of analyses performed and calibration and maintenance of instrumentation and recordings from continuous monitoring instrumentation shall be retained for a minimum of three (3) years, or longer if requested by the Regional Administrator or the State water pollution control agency.

TABLE OF CONTENTS

	Page	
EXECUTIVE SUMMARY	1	1/A6
TABLE OF CONTENTS	vii	1/A12
LIST OF TABLES	x	1/B1
LIST OF FIGURES	xii	1/B3
1.0 INTRODUCTION	1	1/B4
2.0 NEED FOR THE PROJECT	2	1/B5
2.1 NATIONAL ENERGY TRENDS	2	1/B5
2.2 STATE AND REGIONAL ELECTRIC UTILITY TRENDS	3	1/B6
2.3 APPLICANT'S NEED FOR THE PROJECT	5	1/B8
3.0 ALTERNATIVES	6	1/B9
3.1 ALTERNATIVES CONSIDERED BY THE APPLICANT	6	1/B9
3.1.1 No Action	6	1/B9
3.1.2 Purchase or Exchange of Power	6	1/B9
3.1.3 Reactivation or Upgrading of Existing Units	7	1/B10
3.1.4 Conversion of Peaking Units	7	1/B10
3.1.5 Voluntary Consumer Conservation	7	1/B10
3.1.6 Construction of New Power Source	8	1/B11
3.1.7 Selected Alternative	13	1/C6
3.2 ALTERNATIVES AVAILABLE TO USEPA	13	1/C6
3.2.1 Issuance of the Permit	13	1/C6
3.2.2 Denial of the Permit	14	1/C7
3.3 ALTERNATIVES AVAILABLE TO OTHER PERMITTING AGENCIES	14	1/C7
3.4 IMPACTS OF THE APPLICANT'S ALTERNATIVES	15	1/C8
3.4.1 No Action Alternative Impacts	15	1/C8
3.4.2 Impacts of Selected Alternative	20	1/C13
4.0 DESCRIPTION OF THE PROJECT	27	1/D6
4.1 PROJECT LOCATION AND SITE CHARACTERISTICS	27	1/D6
4.2 POWER PLANT DESCRIPTION	28	1/D10
4.2.1 Power Generation Facilities	28	1/D10
4.2.2 Fuel Requirements	28	1/D10
4.2.3 Cooling Pond and Makeup Water System	30	1/E1
4.2.4 Circulating Water System	31	1/E2
4.2.5 Miscellaneous Water Systems	32	1/E3
4.2.6 Auxiliary Facilities	33	1/E4
4.3 POLLUTION CONTROL MEASURES	33	1/E4
4.3.1 Air Pollution Control	33	1/E4
4.3.2 Wastewater Treatment	35	1/E6
4.3.3 Solid Waste Disposal	37	1/E8
4.3.4 Noise Abatement	37	1/E8
4.4 TRANSMISSION LINES	39	1/E10

TABLE OF CONTENTS (Cont.)

	Page	
4.5 POWER PLANT CONSTRUCTION	40	1/E13
4.5.1 Construction Schedule	40	1/E13
4.5.2 Construction Personnel Requirements	41	1/E14
4.5.3 Construction Materials Requirements	41	1/E14
4.5.4 Plant Construction Costs	42	1/F2
4.5.5 Plant Construction to Date	42	1/F2
4.5.6 Construction Impacts to Date	44	1/F4
4.6 POWER PLANT OPERATION	51	1/F11
4.6.1 Personnel Requirements	51	1/F11
4.6.2 Plant Output	52	1/F12
4.6.3 Operating Revenues and Expenses	52	1/F12
5.0 IMPACTS OF THE PROJECT ON THE ENVIRONMENT	54	1/F14
5.1 GEOLOGY	54	1/F14
5.1.1 Topography	54	1/F14
5.1.2 Surface and Subsurface Geology	54	1/F14
5.1.3 Soil Characteristics	55	1/G1
5.1.4 Impacts on Geology	56	1/G3
5.2 HYDROLOGY	57	1/G4
5.2.1 Water Resources	57	1/G4
5.2.2 Water Quality	60	1/G8
5.2.3 Water Supplies and Water Uses	68	2/A7
5.2.4 Impacts on Hydrology	68	2/A7
5.3. AIR QUALITY	72	2/A11
5.3.1 Climatology	72	2/A11
5.3.2 Dispersion Meteorology	72	2/A11
5.3.3 Air Quality	76	2/B6
5.3.4 Prevention of Significant Deterioration	78	2/B8
5.3.5 Impacts on Air Quality	79	2/B9
5.4 SOUND QUALITY	85	2/C3
5.4.1 Existing Conditions	85	2/C3
5.4.2 Impacts on Sound Quality	87	2/C6
5.5 BIOLOGY	88	2/C7
5.5.1 Aquatic Biota	88	2/C7
5.5.2 Landscape Types	92	2/C11
5.5.3 Terrestrial Wildlife	95	2/D2
5.5.4 Endangered and Threatened Species	98	2/D5
5.5.5 Important Biological Resources	100	2/D7
5.5.6 Parks, Preserves, and Wildlife Refuges	100	2/D7
5.5.7 Impacts on Biological Resources	100	2/D7
5.6 ARCHAEOLOGY AND HISTORY	103	2/D10
5.6.1 Archaeological and Historic Resources of the Project Area	103	2/D10
5.6.2 Impacts on Archaeological and Historic Resources	106	2/E1
5.7 SOCIOECONOMICS	108	2/E3
5.7.1 Land Use	108	2/E3
5.7.2 Population Center Characteristics	109	2/E4
5.7.3 Transportation and Traffic	113	2/E10
5.7.4 Impacts on Socioeconomics	113	2/E10

TABLE OF CONTENTS (Cont.)

	Page	
5.8 TRANSMISSION LINES	116	2/E14
5.8.1 Existing Conditions	116	2/E14
5.8.2 Impacts of Transmission Lines	117	2/F1
6.0 COORDINATION	119	2/F3
6.1 PUBLIC PARTICIPATION	119	2/F3
6.2 LCRA PROJECT COORDINATION	119	2/F3
6.3 PERMITS AND APPROVALS	119	2/F3
6.3.1 Other Federal Requirements	120	2/F4
6.3.2 Other State Requirements	120	2/F4
6.4 CORRESPONDENCE	121	2/F5
BIBLIOGRAPHY	128	2/F12
APPENDIX A Draft NPDES Permit	A-1	2/G2
APPENDIX B Biology Supporting Data	B-1	3/A10

A. MANAGEMENT REQUIREMENTS

1. *Change in Discharge*

All discharges authorized herein shall be consistent with the terms and conditions of this permit. The discharge of any pollutant identified in this permit more frequently than or at a level in excess of that authorized shall constitute a violation of the permit. Any anticipated facility expansions, production increases, or process modifications which will result in new, different, or increased discharges of pollutants must be reported by submission of a new NPDES application or, if such changes will not violate the effluent limitations specified in this permit, by notice to the permit issuing authority of such changes. Following such notice, the permit may be modified to specify and limit any pollutants not previously limited.

2. *Noncompliance Notification*

If, for any reason, the permittee does not comply with or will be unable to comply with any daily maximum effluent limitation specified in this permit, the permittee shall provide the Regional Administrator and the State with the following information, in writing, within five (5) days of becoming aware of such condition:

a. A description of the discharge and cause of noncompliance; and

b. The period of noncompliance, including exact dates and times; or, if not corrected, the anticipated time the noncompliance is expected to continue, and steps being taken to reduce, eliminate and prevent recurrence of the noncomplying discharge.

3. *Facilities Operation*

The permittee shall at all times maintain in good working order and operate as efficiently as possible all treatment or control facilities or systems installed or used by the permittee to achieve compliance with the terms and conditions of this permit.

4. *Adverse Impact*

The permittee shall take all reasonable steps to minimize any adverse impact to navigable waters resulting from noncompliance with any effluent limitations specified in this permit, including such accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge.

5. Bypassing

Any diversion from or bypass of facilities necessary to maintain compliance with the terms and conditions of this permit is prohibited, except (i) where unavoidable to prevent loss of life or severe property damage, or (ii) where excessive storm drainage or runoff would damage any facilities necessary for compliance with the effluent limitations and prohibitions of this permit. The permittee shall promptly notify the Regional Administrator and the State in writing of each such diversion or bypass.

6. *Removed Substances*

Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters shall be disposed of in a manner such as to prevent any pollutant from such materials from entering navigable waters.

7. *Power Failures*

In order to maintain compliance with the effluent limitations and prohibitions of this permit, the permittee shall either:

a. In accordance with the Schedule of Compliance contained in Part I, provide an alternative power source sufficient to operate the wastewater control facilities;

or, if such alternative power source is not in existence, and no date for its implementation appears in Part I,

b. Halt, reduce or otherwise control production and/or all discharges upon the reduction, loss, or failure of the primary source of power to the wastewater control facilities.

B. RESPONSIBILITIES

1. *Right of Entry*

The permittee shall allow the head of the State water pollution control agency, the Regional Administrator, and/or their authorized representatives, upon the presentation of credentials:

a. To enter upon the permittee's premises where an effluent source is located or in which any records are required to be kept under the terms and conditions of this permit; and

b. At reasonable times to have access to and copy any records required to be kept under the terms and conditions of this permit; to inspect any monitoring equipment or monitoring method required in this permit; and to sample any discharge of pollutants.

2. *Transfer of Ownership or Control*

In the event of any change in control or ownership of facilities from which the authorized discharges emanate, the permittee shall notify the succeeding owner or controller of the existence of this permit by letter, a copy of which shall be forwarded to the Regional Administrator and the State water pollution control agency.

3. *Availability of Reports*

Except for data determined to be confidential under Section 308 of the Act, all reports prepared in accordance with the terms of this permit shall be available for public

inspection at the offices of the State water pollution control agency and the Regional Administrator. As required by the Act, effluent data shall not be considered confidential. Knowingly making any false statement on any such report may result in the imposition of criminal penalties as provided for in Section 309 of the Act.

4. *Permit Modification*

After notice and opportunity for a hearing, this permit may be modified, suspended, or revoked in whole or in part during its term for cause including, but not limited to, the following:

a. Violation of any terms or conditions of this permit;

b Obtaining this permit by misrepresentation or failure to disclose fully all relevant facts; or

c. A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.

5. *Toxic Pollutants*

Notwithstanding Part II, B-4 above, if a toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is established under Section 307(a) of the Act for a toxic pollutant which is present in the discharge and such standard or prohibition is more stringent than any limitation for such pollutant in this permit, this permit shall be revised or modified in accordance with the toxic effluent standard or prohibition and the permittee so notified.

6. *Civil and Criminal Liability*

Except as provided in permit conditions on "Bypassing" (Part II, A-5) and "Power Failures" (Part II, A-7), nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance.

7. *Oil and Hazardous Substances Liability*

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject under Section 311 of the Act.

8. *State Laws*

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable State law or regulation under authority preserved by Section 510 of the Act.

9. *Property Rights*

The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of Federal, State or local laws or regulations.

10. *Severability*

The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

PART III

OTHER REQUIREMENTS

A. There shall be no discharge of polychlorinated biphenyl transformer fluid.

B. The "daily average" concentration means the arithmetic average (weighted by flow value) of all the daily determinations of concentration made during a calendar month. Daily determinations of concentration made using a composite sample shall be the concentration of the composite sample. When grab samples are used, the daily determination of concentration shall be the arithmetic average (weighted by flow value) of all the samples collected during that calendar day.

C. The "daily maximum" concentration means the daily determination of concentration for any calendar day.

C. Daily average temperature is defined as the flow weighted average temperature (FWAT) and shall be computed and recorded on a daily basis. FWAT shall be computed at equal time intervals nor greater than two hours. The method of calculating FWAT is as follows:

$$\text{FWAT} = \frac{\text{SUMMATION (INSTANTANEOUS FLOW} \times \text{INSTANTANEOUS TEMPERATURE)}}{\text{SUMMATION (INSTANTANEOUS FLOW)}}$$

D. The term "ash transport water" shall mean water used in the transport of either fly ash or bottom ash.

There shall be no discharge of "ash transport water".

Other Requirements (Continued)

E. The term "metal cleaning wastes" shall mean any cleaning compounds, rinse waters, or other waterborne residues derived from cleaning and metal process equipment including, but not limited to, boiler tube cleaning, boiler fire-side cleaning and air preheater cleaning.

There shall be no discharge of "metal cleaning wastes".

"Metal cleaning wastes", water treatment wastes, demineralizer wastes, and boiler lowdown shall be routed into the closed cycle ash handling system.

F. The term "low-volume waste sources" means, wastewaters from, but not limited to: wet scrubber air pollution control systems, ion exchange water treatment system, water treatment, evaporator blowdown, laboratory and sampling streams, floor drainage, cooling tower basin cleaning wastes and blowdown from recirculating house service water systems.

G. The term "area runoff" means discharges resulting from material storage runoff and construction runoff.

The term "material storage runoff" means the rainfall runoff from or through any coal, ash or other material storage pile.

The term "construction runoff" means the rainfall runoff from any construction activity and any earth surface disturbed by such activity from the inception of construction until construction is complete and any disturbed earth is returned to a vegetative or other cover commensurate with the intended land use.

Any untreated overflow from facilities designed, constructed and operated to treat the volume of "material storage runoff" and "construction runoff" which is associated with a 10 year, 24 hour rainfall event shall not be subject to the limitations specified in Part 1, area runoff, of this permit.

The term "10 year, 24 hour rainfall event" shall mean a rainfall event with a probable recurrence interval of once in ten years as defined by the National Weather Service in Technical Paper No. 40, "Rainfall Frequency Atlas of the United States," May 1961, and subsequent amendments, or equivalent regional or state rainfall probability information developed therefrom.

H. The applicant's makeup water intake structure, located on the Colorado River, meets the requirements of Section 316(b) of the Clean Water Act and is hereby approved.

Other Requirements (Continued)

I. The permit shall be modified, or alternatively, revoked and reissued, to comply with any applicable effluent standard or limitation issued or approved under sections 301(b)(2)(C), and (D), 304(b)(2), and 307(a)(2) of the Clean Water Act, if the effluent standard or limitation so issued or approved:

(1) Contains different conditions or is otherwise more stringent than any effluent limitation in the permit; or

(2) Controls any pollutant not limited in the permit.

The permit as modified or reissued under this paragraph shall also contain any other requirements of the Act then applicable.

J. The term "free available chlorine" shall mean the value obtained using the amperometric titration method for free available chlorine described in "Standard Methods for the Examination of Water and Wastewater", page 112 (13th edition).

Neither free available chlorine nor total residual chlorine may be discharged from any unit for more than two hours in any one day and not more than one unit in any plant may discharge free available or total residual chlorine at any one time unless 1) the permittee can demonstrate to the permitting Agency that the units in a particular location cannot operate at or below the limitations specified in this permit, or 2) such discharge is part of an approved chlorine minimization program.

K. The permittee shall submit, for EPA approval, a study plan to demonstrate the minimum level of chlorination required to prevent biofouling of the condenser tubes. This study shall consider seasonal temperature differences, variations in chlorine concentrations and time of chlorination, and predicted water quality changes. It shall be designed to be conducted for at least one calendar year following operation of each unit at greater than 5% of rated thermal power. The study plan shall be submitted within 90 days of the effective date of this permit. Results of the study shall be submitted within 18 months of the operation at greater than 5% of rated thermal power. Chlorine concentrations determined by this study may be used for modification of chlorine limitations.

APPENDIX B

BIOLOGY SUPPORTING DATA

Table		Page
1	Phytoplankton Collected At The Fayette Power Project Site. .	B-1
2	Zooplankton Collected At The Fayette Power Project Site. . .	B-4
3	Benthos Collected At Cedar Creek Stations On The Fayette Power Project Site	B-5
4	Fishes Which May Occur In The Vicinity Of The Fayette Power Project Site	B-7
5	Fish Collected At The Fayette Power Project Site	B-10
6	Plants Collected On The Fayette Power Project Site	B-14
7	Percent Aerial Cover By Plant Species In A Well-Drained Upland Prairie Stand	B-22
8	Percent Aerial Cover In An Ungrazed Moist Prairie.	B-23
9	Percent Aerial Cover By Plant Species In An Improved Pasture.	B-24
10	Percent Aerial Cover By Plant Species In An Overgrazed Field.	B-25
11	Upland Cedar-Oak Woodland Near Access Road	B-26
12	Mesic Forest Stand In Impoundment Area	B-27
13	Floodplain Forest Stand In Borrow Area	B-28
14	Amphibians And Reptiles Which May Occur On The Fayette Power Project Site	B-29
15	Birds Which May Breed On The Fayette Power Project Site. . .	B-32
16	Results Of Early Morning Cock-Call Count On The Fayette Power Project Site	B-35
17	Mammals Which May Occur On The Fayette Power Project Site. .	B-36
18	Results Of Small-Mammal Trapping On The Fayette Power Project Site	B-38
19	Numbers And Relative Abundances Of Tracks Of Large Mammals Recorded On 4.0 Km Of Track Transects On The Fayette Power Project Site	B-39

Table 1. Phytoplankton collected at the Fayette Power Project Site.

Species	No. Individuals/ml					
	Cedar Creek			Colorado River		
	Sta.1	Sta.2	Sta.3	Sta.4	Sta.5	Sta.6
Chlorophyta						
Chlamydomonas sp.		114.3	56.7	29.9		18.7
Carteria sp.			22.5		22.8	
Eudorina sp.			11.3			
Protococcus viridis			22.5			
Chlorococcum sp.				9.9		
Chlorella sp.		22.9	45.4	19.7	11.4	
Dictyosphaerium sp.	50.0				22.8	
Lagerheimia ciliata					11.4	
Ankistrodesmus falcatus			11.3			
Kirchneriella obesa		11.3				
Scenedesmus arcuatus				9.9		
S. dimorphus				9.9	11.4	
S. quadricauda				9.9		
Scenedesmus sp.				19.7	22.8	
Tetrastrum staurogeniaeforme					11.4	
Closterium sp.			11.3		11.4	
Furcilla sp.					11.4	
Chlorophycean zoospore		45.8	11.3		22.8	
Euglenophyta						
Euglena sp.	21.1	126.0	22.5		11.4	
Pyrrhophyta						
Ceratium hircus					11.4	
Glenodinium sp.					11.4	
Chroomonas sp.		22.9				
Cryptomonas sp.			11.3		11.4	

Table 1. Phytoplankton collected at the Fayette Power Project Site. (cont.)

Species	No. Individuals/ml					
	Cedar Creek			Colorado River		
	Sta.1	Sta.2	Sta.3	Sta.4	Sta.5	Sta.6
Cyanophyta						
Chroococcus sp.		22.9				
Aphanocapsa sp.	10.4					
Merismopedia glauca				9.9		
Coelosphaerium sp.					11.4	
Oscillatoria sp.	50.0	11.3	11.3	9.9	22.8	9.3
Nostoc sp.					11.4	
Chrysophyta						
Cyclotella meneghiniana			22.5	9.9		
Melosira crenulata					34.6	
Skeletonema costatum					22.8	
Diatoma vulgare				9.9		
Fragilaria pinnata				9.9		
Synedra ulna	10.4			9.9		
Cocconeis sp.			45.4			
Amphipleura lindheimeri			11.3			
Caloneis ventricosa	189.0		45.4		9.3	
Navicula cryptocephala		11.3			11.4	
N. gracilis				9.9		
N. pupula				9.9	11.4	
N. radiosa				9.9	11.4	
Navicula sp.	21.1	22.9	11.3		11.4	18.7
Gomphonema parvulum	10.4				11.4	9.3
Amphora sp.	10.4					
Cymbella ventricosa			11.3	9.9		
Nitzschia acicularis			11.3	9.9		

Table 1. Phytoplankton collected at the Fayette Power Project Site. (cont.)

Species	No. Individuals/ml					
	Cedar Creek			Colorado River		
	Sta.1	Sta.2	Sta.3	Sta.4	Sta.5	Sta.6
Chrysophta (Cont.)						
Nitzshia linearis					11.4	
N. longissima	10.4					
N. obtusa			11.3			
N. palea	220.5		22.5	9.9	22.8	
N. sigmoidea					11.4	
Hantzschia amphioxys		11.3				

Table 2. Zooplankton collected at the Fayette Power Project Site.

Species	No. Individuals/ml					
	Cedar Creek			Colorado River		
	Sta.1	Sta.2	Sta.3	Sta.4	Sta.5	Sta.6
Rotifera						
Trichocerca sp.	2.5					
Keratella cochlearis		10.0		2.5		
Brachionus havanaensis		2.5	2.5			
Filinia longiseta		7.5		2.5		
Unknown sp.		2.5				
Conochilus unicornis			7.5			
Cephalodella sp.			5.0			
Lecane sp.			2.5			2.5
Macrochaetus sp.			2.5			
Brachionus budapestinensis				2.5		
Hexarthra mira					2.5	
Polyarthra vulgaris						2.5
Copepoda						
Nauplii	5.0	25.0	5.0	5.0		2.5
Other						
Codonella cratera						2.5
Difflugia acuminata			17.5			
Nematoda	7.5		7.5			
Plecoptera	2.5					
Chironomidae					5.0	

Table 3. Benthos collected at Cedar Creek Stations on the Fayette Power Project Site.

No. individuals/m^2

Species	Station 1		Station 2			Station 3	
	Sandy riffles	Pool	Sandy riffles	Gravel riffles	Bedrock	Gravel riffles	Pool
Odonata							
Basiaeschna janata							+
Paltothemis sp.		+					
Erythemis sp.	3.6						
Libullulidae							+
Gemphidae			5.4				
Coenagrionidae*		++	2.7	5.4	5.4	22.6	++
Ephemeroptera							
Caenis sp.	3.6	++	2.7				++
Siphlonurus sp.		+					++
Isonyschia sp.						10.8	
Paraleptophlebia sp.						10.8	
Trichoptera							
Cheumatopsyche sp.				5.4		40.4	
Chimarra sp.						32.3	
Hydroptilidae						5.4	
Coleoptera							
Hydrovatus sp.		+					
Berosus sp.	107.6						
Hydrophilidae	3.6						

Table 3. Benthos collected at Cedar Creek Stations on the Fayette Power Project Site. (cont.)

Species	Station 1		Station 2			Station 3	
	Sandy riffles	Pool	Sandy riffles	Gravel riffles	Bedrock	Gravel riffles	Pool
Diptera							
Chironomidae		+					+
Ceratopogonidae							+
Tabanus sp.				5.4			
Hemiptera							
Corixidae	3.6						
Amphipoda							
Hyallela azteca		+					+
Gastropoda							
Planorbidae	3.6						
Physa sp.		+				2.7	+

* Mixture of the common and widely distributed genera Ischnura and Enallagma

\+ Present in dip net (qualitative) sample

++ Abundant in dip net sample

Table 4. Fishes which may occur in the vicinity of the Fayette Power Project Site.

Family/Common Name	Scientific Name
Lepisosteidae	
Alligator gar	Lepisosteus spatula
Spotted gar	Lepisosteus oculatus
*Longnose gar	Lepisosteus osseus
Amiidae	
Bowfin	Amia calva
Clupeidae	
Skipjack herring	Alosa chrysochloris
Threadfin shad	Dorosoma petenense
*Gizzard shad	Dorosoma cepedianum
Characidae	
Mexican tetra	Astyanax mexicanus
Cyprinidae	
Carp	Cyprinus carpio
Goldfish	Carassius auratus
Golden shiner	Notemigonus crysoleucas
Pugnose minnow	Opsopoedus emiliae
Speckled chub	Hybopsis aestivalis
Suckermouth minnow	Phenacobius mirabilis
Sharpnose shiner	Notropis oxyrhynchus
*Texas shiner	Notropis amabilis
Brazos river shiner	Notropis brazosensis
Chub shiner	Notropis potteri
Pallid shiner	Notropis amnis
*Blacktail shiner	Notropis venustus
*Red shiner	Notropis lutrensis
Mimic shiner	Notropis volucellus
Ghost shiner	Notropis buchanani
*Bullhead minnow	Pimephales vigilax
Fathead minnow	Pimephales promelas
*Stoneroller	Campostoma anomalum
Catostomidae	
Blue sucker	Cycleptus elongatus
Smallmouth buffalo	Ictiobus bubalus
*River carpsucker	Carpiodes carpio
*Gray redhorse	Moxostoma congestum

Table 4. Fishes which may occur in the vicinity of the Fayette Power Project Site. (cont.)

Family/Common Name	Scientific Name
Ameiridae	
*Channel catfish	Ictalurus punctatus
Blue catfish	Ictalurus furcatus
*Black bullhead	Ictalurus melas
Yellow bullhead	Ictalurus natalis
Flathead catfish	Pylogictus olivaris
Tadpole madtom	Noturus gyrinus
Angvillidae	
American eel	Anguilla rostrata
Belonidae	
Atlantic needlefish	Strongylura marina
Cyprinodontidae	
*Blackstripe topminnow	Zygonectes notatus
Poeciliidae	
*Mosquitofish	Gambusia affinis
Sailfin molly	Poecilia latipinna
Mugilidae	
Striped mullet	Mugil cephalus
White mullet	Mugil curema
Percichthyidae	
White bass	Morone chrysops
Centrarchidae	
Spotted bass	Micropterus punctulatus
Guadalupe bass	Micropterus treculi
*Largemouth bass	Micropterus salmoides
*Warmouth	Chaenobryttus gulosus
*Green sunfish	Chaenobryttus cyanellus
*Spotted sunfish	Lepomis punctatus
Redear sunfish	Lepomis microlophus
*Bluegill sunfish	Lepomis macrochirus
Orange spotted sunfish	Lepomis humilis
Redbreast sunfish	Lepomis auritus
*Longear sunfish	Lepomis megalotis
White crappie	Pomoxis annularis
Black crappie	Pomoxis nigromaculatus

Table 4. Fishes which may occur in the vicinity of the Fayette Power Project Site. (cont.)

Family/Common Name	Scientific Name
Percidae	
*Dusky darter	Hadropterus scierus
Logperch	Percina caprodes
Bluntnose darter	Etheostoma chlorosomum
Slough darter	Etheostoma gracile
Orangebelly darter	Etheostoma spectabile
Scianidae	
Freshwater drum	Aplodinotus grunniens
Cichlidae	
Rio Grande cichlid	Cichlasoma cyanoguttatum

[1] According to Hubbs (1972) and Tilton (1961)

* Collected on the site

Table 5. Fish collected at the Fayette Power Project Site.

Station[2]	Species	No.	Length (mm) range (mean)	Total Weight (g)
1	Gambusia affinis	9	19-47(31)	6.6
(upstream)	Chaenobryttus cyanellus	10	35-80(56)	28.2
	Lepomis macrochirus	6	39-72(53)	28.2
	Lepomis megalotis	2	50-51(50)	8.2
1	Ictalurus melas	1	155	77.1
(downstream)	Gambusia affinis	5	20-30(25)	1.2
	Micropterus salmoides	1	46	1.1
	Chaenobryttus cyanellus	5	44-77(60)	36.2
	Lepomis macrochirus	2	59-64(62)	13.0
2	Notropis lutrensis	2	37-40(38)	0.6
	Campostoma anomalum	1	42	0.8
	Gambusia affinis	10	15-38(23)	2.6
	Micropterus salmoides	1	55	2.3
	Lepomis punctatus	1	54	3.4
	Lepomis macrochirus	5	41-86(60)	37.1
	Lepomis megalotis	1	85	20.6

Table 5. Fish collected at the Fayette Power Project Site. (cont.)

Station[2]	Species	No.	Length (mm) range (mean)	Total Weight (g)
3	Dorosoma cepedianum	2	61-131(96)	36.4
(pool)	Notropis venustus	8	41-62(52)	16.6
	Notropis lutrensis	2	37-44(40)	2.0
	Zygonectes notatus	5	57-65(60)	12.7
	Gambusia affinis	2	30-42(36)	1.6
	Micropterus salmoides	12	39-215(87)	450.0
	Chaenobryttus gulosus	1	113	33.6
	Chaenobryttus cyanellus	5	25-59(41)	12.0
	Lepomis punctatus	10	61-87(70)	103.6
	Lepomis macrochirus	25	41-138(60)	190.2
	Lepomis megalotis	5	102-116(107)	209.5
3	Notropis venustus	2	35-51(43)	2.8
(riffles)	Notropis lutrensis	7	40-49(45)	9.9
	Campostoma anomalum	2	48-52(50)	4.0
	Carpiodes carpio	1	94	20.6
	Micropterus salmoides	1	54	2.3
	Lepomis punctatus	1	61	6.7
	Lepomis macrochirus	1	60	5.6
	Lepomis megalotis	2	60-68(64)	17.2

Table 5. Fish collected at the Fayette Power Project Site. (cont.)

Station[2]	Species	No.	Length (mm) range (mean)	Total Weight(g)
4	Dorosoma cepedianum	10	52-116(63)	49.8
	Notropis amabilis	2	41-46(44)	1.8
	Notropis venustus	1	46	0.4
	Notropis lutrensis	34	37-42(39)	37.4
	Pimephales vigilax	6	39-53(44)	8.0
	Carpiodes carpio	2	17-24(20)	0.1
	Moxostoma congestum	1	47	1.2
	Ictalurus punctatus	2	23,23	0.1
	Micropterus salmoides	2	44-53(48)	3.7
	Chaenobryttus gulosus	1	47	1.°
	Chaenobryttus cyanellus	1	29	0.3
	Lepomis punctatus	1	50	3.3
	Lepomis macrochirus	2	31-35(33)	1.4
5	Notropis amabilis	4	41-58(51)	6.8
	Notropis venustus	4	45-50(48)	5.7
	Notropis lutrensis	72	36-48(40)	71.6
	Pimephales vigilax	3	40-47(43)	3.1
	Campostoma anomalum	1	40	0.4
	Carpiodes carpio	1	121	41.4
	Moxostoma congestum	1	45	1.2

Table 5. Fish collected at the Fayette Power Project Site. (cont.)

Station[2]	Species	No.	Length (mm) range (mean)	Total Weight (g)
5 (cont.)	Ictalurus punctatus	1	30	0.1
	Ictalurus melas	1	42	0.8
	Gambusia affinis	2	27-28(28)	1.5
	Micropterus salmoides	1	34	0.4
	Hadropterus scierus	1	24	0.1
5 (gill net set at mouth of Cedar Creek)	Lepisosteus osseus	3	470-628(537)	1,589.0
	Dorosoma cepedianum	6	279-317(298)	2,270.0
	Carpiodes carpio	5	279-381(312)	3,497.2
	Moxostoma congestum	1	559	1,759.2
	Ictalurus punctatus	1	343	666.8
6	Dorosoma cepedianum	13	23-310(103)	948.3
	Notropis venustus	1	45	1.4
	Notropis lutrensis	18	35-45(40)	20.1
	Pimephales vigilax	5	40-43(41)	5.0
	Carpiodes carpio	10	15-24(19)	1.5
	Ictalurus punctatus	1	36	0.8
	Gambusia affinis	1	28	0.7
	Micropterus salmoides	6	40-52(44)	7.7
	Chaenobryttus gulosus	2	16-25(20)	0.6

1 All collections, except Station 5, mouth of Cedar Creek, taken with seines.

2 See Fig. 5-2 for sampling station locations.

Table 6. Plants collected on the Fayette Power Project Site.

Family/Common Name	Scientific Name
Characeae	
Chara	*Chara* sp.
Polypodiaceae	
Resurrection fern	*Polypodium polypodioides* var. *michauxianum*
Ebony spleenwort	*Asplenium platyneuron*
Pinaceae	
Loblolly pine	*Pinus taeda*
Cupressaceae	
Eastern red cedar	*Juniperus virginiana*
Typhaceae	
Common cat-tail	*Typha latifolia*
Gramineae	
Georgia cane	*Arundo donax*
Sessile-flowered spikegrass	*Chasmanthium sessiliflorum*
Rescue grass	*Bromus unioloides*
Canada wild-rye	*Elymus canadensis*
Southern crabgrass	*Digitaria adscendens*
St. Augustine grass	*Stenotaphrum secundatum*
Thin paspalum	*Paspalum setaceum*
Florida paspalum	*Paspalum floridanum*
Brownseed paspalum	*Paspalum plicatulum*
Dallis grass	*Paspalum dilatatum*
Beaked panicum	*Panicum anceps*
Filly panicum	*Panicum filipes*
Knotroot bristlegrass	*Setaria geniculata*
Yellow foxtail	*Setaria glauca*
Grassbur	*Cenchrus incertus*
Little bluestem	*Schizachyrium scoparium*
Big bluestem	*Andropogon gerardi*
Silver beardgrass	*Bothriochloa saccharoides*
King ranch bluestem	*Bothriochloa ischaemum*
Joint-tail	*Manisuris clyindrica*
Mourning lovegrass	*Eragrostis lugens*
Red lovegrass	*Eragrostis oxylepis*
Johnson grass	*Sorghum halepense*
Smutgrass	*Sporobolus indicus*

Table 6. Plants collected on the Fayette Power Project Site. (cont.)

Family/Common Name	Scientific Name
Tall dropseed	Sporobolus asper
Bermuda grass	Cynodon dactylon
Hairy grama	Bouteloua hirsuta
Texas grama	Bouteloua rigidiseta
Side-oats grama	Bouteloua curtipendula
Red three-awn	Aristida longiseta
Cyperaceae	
Fimbry	Fimbristylis caroliniana
Taperleaf flatsedge	Cyperus acuminatus
False nut-grass	Cyperus strigosus
White-topped umbrella grass	Dichromena colorata
Bromeliaceae	
Ball moss	Tillandsia recurvata
Spanish moss	Tillandsia usneoides
Commelinaceae	
Day-flower	Commelina sp.
Juncaceae	
Grass-leaf rush	Juncus marginatus
Liliaceae	
Cat-brier	Smilax bona-nox
Amaryllidaceae	
Drummond rain-lily	Cooperia drummondii
Copper lily	Habranthus texanus
American aloe	Polianthes lata
Purple pleat-leaf	Eustylis purpurea
Salicaceae	
Black willow	Salix nigra
Eastern cottonwood	Populus deltoides
Juglandaceae	
Mockernut	Carya tomentosa
Black hickory	Carya texana

Table 6. Plants collected on the Fayette Power Project Site. (cont.).

Family/Common Name	Scientific Name
Fagaceae	
Post oak	Quercus stellata
Bastard oak	Quercus sinuata
Live oak	Quercus fusiformis
Water oak	Quercus nigra
Shumard oak	Quercus shumardii
Blackjack oak	Quercus marilandica
Black oak	Quercus velutina
Ulmaceae	
Texas sugarberry	Celtis laevigata
Cedar elm	Ulmus crassifolia
Moraceae	
Red mulberry	Morus rubra
Bois d'arc	Maclura pomifera
Polygonaceae	
Fiddle dock	Rumex pulcer
Menispermaceae	
Red-berried moonseed	Cocculus carolinus
Papaveraceae	
Prickly poppy	Argemone aurantiaca
Droseraceae	
Annual sundew	Drosera annua
Saxifragaceae	
Ditch stonecrop	Penthorum sedoides
Platanaceae	
Sycamore	Platanus occidentalis
Rosaceae	
Dewberry	Rubus trivialis
Mexican plum	Prunus mexicana

Table 6. Plants collected on the Fayette Power Project Site. (cont.)

Family/Common Name	Scientific Name
Leguminosae	
Sensitive brier	Schrankia uncinata
Illinois bundle flower	Desmanthus illinoensis
Yellow-puff	Neptunia lutea
Honey mesquite	Prosopis glandulosa
Partridge pea	Cassia fasciculata
Retama	Parkinsonia aculeata
Plains wild indigo	Baptisia leucophaea
Texas bluebonnet	Lupinus texensis
Scarlet pea	Indigofera miniata
Golden dalea	Dalea aurea
Round-head prairie-clover	Petalostemum multiflorum
Showy prairie-clover	Petalostemum pulcherrimum
Rattlebrush	Sesbania drummondii
Milk-vetch	Astragalus sp.
Pencil-flower	Stylosanthes biflora
Butterly pea	Centrosema virginianum
Coral bean	Erythrina herbacea
Krameriaceae	
Krameria	Krameria lanceolata
Rutaceae	
Wafer-ash	Ptelea trifoliata subsp. trifoliata var. mollis
Meliaceae	
Chinaberry-tree	Melia azedarach
Polygalaceae	
White milkwort	Polygala alba
Pink milkwort	Polygala incarnata
Euphorbiaceae	
Wooly croton	Croton capitatus
Prairie-tea	Croton monanthogynus
Chinese tallow tree	Sapium sebiferum
Bull nettle	Cnidoscolus texanus

Table 6. Plants collected on the Fayette Power Project Site. (cont.)

Family/Common Name	Scientific Name
Anacardiaceae	
Poison ivy	*Rhus toxicodendron*
Smooth sumac	*Rhus glabra*
Aquifoliaceae	
Deciduous holly	*Ilex decidua*
Yaupon	*Ilex vomitoria*
Sapindaceae	
Soap-berry	*Sapindus saponaria*
Rhamnaceae	
Rattan-vine	*Berchemia scandens*
Vitaceae	
Virginia creeper	*Parthenocissus quinquefolia*
Pepper-vine	*Ampelopsis arborea*
Malvaceae	
Drummon wax-mallow	*Malvaviscus arboreus* var. *drummondii*
Wine-cup	*Callirhoe involucrata*
Cistaceae	
Pin-weed	*Lechea tenuifolia*
Passifloraceae	
Yellow passion-flower	*Passiflora lutea*
Passion-flower	*Passiflora incarnata*
Cactaceae	
Prickly pear	*Opuntia compressa*
Lythraceae	
Loosestrife	*Lythrum lanceolata*
Onagraceae	
Yellow evening primrose	*Calylophus serrulatus*
Showy primrose	*Oenothera speciosa*
Cut-leaved evening primrose	*Oenothera laciniata*
Water-primrose	*Ludwigia octavalis*

Table 6. Plants collected on the Fayette Power Project site. (cont.)

Family/Common Name	Scientific Name
Umbelliferae	
Button snake-root	Eryngium yuccifolium var. yuccifolium
Cornaceae	
Rough-leaf dogwood	Cornus drummondii
Primulaceae	
Scarlet pimpernel	Anagallis arvensis
Sapotaceae	
Coma	Bumelia lanvginosa
Ebenaceae	
Common persimmon	Diospyros virginiana
Oleaceae	
Red ash	Fraxinus pennsylvanica
Swamp privit	Forestiera ligustrina
Gentianaceae	
Rose-gentian	Sabatia campestris
Bluebells	Eustoma grandiflorum
Asciepiadaceae	
Antelope-horn	Asclepias viridis
Butterfly-weed	Asclepias tuberosa
Green milkweed	Asclepias viridiflora
Whorled milkweed	Asclepias verticillata
Matelea	Matelea gonocarpa
Convolvulaceae	
Pony-foot	Dichondra carolinensis
Bindweed	Ipomoea trichocarpa
Polemoniaceae	
Drummonds phlox	Phlox drummondii
Verbenaceae	
Vervain	Verbena sp.
Texas frog-fruit	Phyla incisa
American beautyberry	Callicarpa americana

Table 6. Plants collected on the Fayette Power Project site. (cont.)

Family/Common Name	Scientific Name
Labiatae	
American germander	Teucrium canadense
Lyre-leaf sage	Salvia lyrata
Tropical sage	Salvia coccinea
Lemon beebalm	Monarda citriodora
Spotted beebalm	Monarda punctata var. intermedia
Solanaceae	
Ground cherry	Physalis spp.
Silver-leaf nightshade	Solanum eleagnifolium
Buffalo bur	Solanum rostratum
Scrophulariaceae	
Water-hyssop	Bacopa caroliniana
Common mullein	Verbascum thapsus
Bluehearts	Buchnera americana
Texas paintbrush	Castilleja indivisa
Bignoniaceae	
Trumpet-creeper	Campsis radicans
Acanthaceae	
Wild petunia	Ruellia sp.
Rubiaceae	
Prairie bluets	Hedyotis nigricans
Poor joe	Diodia teres
Caprifoliaceae	
Coral-berry	Symphoricarpos sp.
Compositae	
Missouri ironweed	Vernonia missurica
Smooth gayflower	Liatris squarrosa var. alabamensis
Mist-flower	Eupatorium coelestinum
Consumption-weed	Baccharis halimifolia
Camphor weed	Heterotheca sp.

Table 6. Plants collected on the Fayette Power Project site. (cont.)

Family/Common Name	Scientific Name
Goldenrod	Solidago sp.
Aster	Aster sp.
Horse-weed	Conyza canadensis
Lazy daisy	Aphanostephus sp.
Everlasting	Gnaphalium sp.
Compass-plant	Silphium laciniatum
Green-eyes	Berlandiera betonicifolia
Marsh elder	Iva annus
Giant ragweed	Ambrosia trifida
Ragweed	Ambrosia artemisiifolia
Cocklebur	Xanthium strumarium
Creeping spot-flower	Spilanthes americana var. repens
Purple cone-flower	Echinacea sp.
Brown-eyed susan	Rudbeckia hirta
Mexican hat	Ratibida columnaris
Frostweed	Verbesina virginica
Indian blanket	Gaillardia pulchella
Lance-leaf gaillardia	Gaillardia aestivalis
Bitterweed	Helenium amarum
Reverchon palafoxia	Palafoxia reverchonii
False dandelion	Pyrrhopappus carolinianus
Skeleton-plant	Lygodesmia texana

Table 7. Percent aerial cover by plant species in a well-drained upland prairie stand.

Species	Percent Cover*
Schizachrium scoparium	47.9%
Sorghastrum avenaceum	15.7
Paspalum floridanum	7.5
Stipa leucotricha	4.9
Andropogon gerardi	4.1
Bouteloua hirsuta	3.3
Aristida sp.	0.9
Dicotyledoneae (2 spp.)	1.7
Petalostemum multiflorum	0.8
Commelina sp.	0.8
Poaceae	0.8
Carex sp.	0.8
Ambrosia artemisiifolia	0.8
Asclepias viridis	+
Berlandiera betonicifolia	+
Bouteloua curtipendula	+
Cassia fasciculata	+
Centrosoma virginianum	+
Dichondra carolinensis	+
Elymus canadensis	+
Helianthus sp.	+
Monarda citriodora	+
Panicum sp.	+
Schrankia uncinita	+
Silphium lacinatum	+
Smilax sp.	+
Solanum sp.	+
Verbena sp.	+
STANDING DEAD	8.3
PLANT LITTER	1.7
	100.0

* + = present but not sampled

Table 8. Percent aerial cover in an ungrazed moist prairie.

Species	Percent Cover
Schizachyrium scoparium	25.2%
Sorghastrum avenaceum	17.1
Manisuris cylindrica	9.9
Paspalum floridanum	9.9
Carex spp.	9.9
Cyperaceae	4.5
Stipa leucotricha	3.6
Andropogon gerardi	2.7
Hedyotis nigricans	1.8
Krameria lanceolata	1.8
Desmanthus illinoensis	1.8
Schrankia uncinata	0.9
Solanum sp.	0.9
Aster sp.	0.9
Poaceae	0.9
STANDING DEAD	3.6
PLANT LITTER	4.5
	99.9

Table 9. Percent aerial cover by plant species in an improved pasture.

Species	Percent Cover*
Paspalum spp.	50.6%
Digitaria adscendens	12.7
Cynodon dactylon	9.2
Lespedeza striata	3.4
Ambrosia artemisiifolia	2.3
Dicotyledoneae	2.3
Carex sp.	2.3
Panicum spp.	2.3
Erigeron sp.	1.2
Sesbania drummondii	1.2
Euphorbia spp.	1.1
Diodia teres	1.1
Umbelliferae	1.1
Cassia fasciculata	+
Cenchrus incertus	+
Calirhoe sp.	+
Commelina sp.	+
Convolvulus sp.	+
Croton capitatus	+
Eragrostis oxylepis	+
Gnaphalium sp.	+
Helenium amarum	+
Juncus marginatus	+
Lythrum lanceolatum	+
Monarda citriodora	+
Oenothera lanceolata	+
Oxalis sp.	+
Ratibida columnaris	+
Rudbeckia hirta	+
Verbena sp.	+
BARE SOIL	4.6
PLANT LITTER	4.6
	100.0

* + = present but not samples

Table 10. Percent aerial cover by plant species in an overgrazed field.

Species	Percent Cover*
Aristida oligantha	37.6%
Hedyotis nigricans	14.0
Phyla incisa	10.8
Bothriochloa saccharoides	3.2
Croton capitatus	2.1
Dichondra carolinensis	2.1
Xanthocephalum sp.	2.1
Monarda citriodora	1.1
Petalostemum multiflorum	1.1
Petalostemum pulcherrimum	1.1
Shrankia uncinata	1.1
Carex sp.	1.1
Dicotyledoneae	1.1
Bouteloua rigidiseta	+
Calylophus sp.	+
Cenchrus incertus	+
Commelina sp.	+
Digitaria sp.	+
Lupinus texensis	+
Muhlenbergia sp.	+
Panicum sp.	+
Paspalum sp.	+
Setaria geniculata	+
BARE SOIL	17.2
PLANT LITTER	4.3
	100.0

* + = present but not sampled

Table 11. Upland cedar-oak woodland near access road.

Data from counting and measuring trees and saplings in ten 100 m^2 circular plots

Trees	Stem Count	Frequency (%)	Mean Basal Area (cm^2)	Density (Stems/ha)	Total Basal Area (dm^2/ha)
Juniperus virginiana	37	90	193.4	370	716
Quercus stellata	25	50	165.0	250	413
Quercus marilandica	18	70	145.0	180	261
TOTAL	80			800	1,390
Saplings and Shrubs					
Juniperus virginiana	43			430	
Quercus stellata	24			240	
Q. marilandica	20			200	
Ilex vomitoria	18			180	
Calicarpa americana	7			70	
Carya texana	3			30	
Bumelia lanuginosa	2			20	
Prunus mexicana	2			20	
Quercus nigra	1			10	
TOTAL	120			1,200	

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Table 12. Mesic forest stand in impoundment area.

Data from 20 Quarter Points. Relative Values are Expressed as Percentages

Species	Stem Count	Density (Stems/ha)	Relative Density	Mean Basal Area (cm^2)	Basal Area (dm^2/ha)	Relative Basal Area	Frequency (%)	Relative Frequency	Relative Importance
Celtis laevigata	16	91.7	20.0	352	323	10.2	45.0	15.8	15.3
Juniperus virginiana	15	86.2	18.8	523	451	14.2	55.0	19.3	17.4
Quercus nigra	12	68.8	15.0	839	577	18.2	45.0	15.8	16.3
Q. shumardii	10	57.3	12.5	550	315	9.9	35.0	12.3	11.6
Q. virginiana	8	45.8	10.0	1,428	654	20.6	35.0	12.3	14.3
Fraxinus pennsylvanica	6	34.4	7.5	1,050	361	11.4	25.0	8.8	9.2
Ulmus crassifolia	5	28.4	6.2	506	143	4.5	15.0	5.3	5.3
U. americana	4	22.9	5.0	242	55	1.7	15.0	5.3	4.0
Quercus stellata	3	17.4	3.8	1,674	291	9.2	10.0	3.5	5.5
Sapindus saponaria	1	6.0	1.3	153	9	.3	5.0	1.7	1.1
TOTALS	80	458.9	100.1		3,179	100.2		100.1	100.0

Table 13. Floodplain forest stand in borrow area.

Trees	Stem Count	Frequency (%)	Mean Basal Area (cm^2)	Density (stems/ha)	Total Basal Area (dm^2/ha)
Ulmus crassifolia	24	78.6	344.7	171.4	590
Fraxinus pennsylvanica	19	57.1	570.0	135.7	773
Sapindus saponaria	10	28.6	146.4	71.4	105
Quercus stellata	1	7.1	856.2	7.1	61
TOTAL	54			385.6	1,529

Saplings and Shrubs	Stem Count	Density (stems/ha)
Ulmus crassifolia	17	170
Fraxinus pennsylvanica	3	30
Celtis laevigata	1	10
Sapindus saponaria	16	160
Ilex vomitoria	55	550
Forestiera ligustrina	20	200
Calicarpa americana	11	110
Bumelia lanuginosa	2	20
Ptelia trifoliata	3	30
TOTAL	128	1,280

Table 14. Amphibians and reptiles which may occur on the Fayette Power Project Site.

Common Name	Scientific Name	Habitat Preference[2]
Lesser siren	Siren intermedia	W
Small-mouthed salamander	Ambystoma texanum	G,W
Tiger salamander	Ambystoma tigrinum	F,G,W
Red-spotted newt	Notophthalmus viridescens	F,W
Couch's spadefoot	Scaphiopus couchi	F
Eastern spadefoot	Scaphiopus holbrooki	G
*Cricket frog	Acris crepitans	W
*Green treefrog	Hyla cinerea	F,G,W
Gray treefrog	Hyla chrysoscelis	F,W
Spotted chorus frog	Pseudacris clarki	F,G,W
Strecker's chorus frog	Pseudacris streckeri	G,W
Upland chorus frog	Pseudacris triseriata	F,W
Texas toad	Bufo speciosus	G,W
*Gulf coast toad	Bufo valliceps	F,G,W
*Woodhouse's toad	Bufo woodhousei	F,G,W
Crawfish frog	Rana aeorlata	W
*Bulifrog	Rana catesbeiana	W
Bronze frog	Rana clamitans	W
Pickerel frog	Rana palustris	G,W
*Southern leopard frog	Rana utricularia	F,G,W
Eastern narrow-mouthed toad	Gastrophryne carolinensis	F,G,W
Great plans narrow-mouthed toad	Gastrophryne olivacea	G,W
Snapping turtle	Chelydra serpentina	W
Yellow mud turtle	Kinosteron flavescens	W
*Eastern mud turtle	Kinosteron subrubrum	W
Stinkpot	Sternothaerus odoratus	W
River cooter	Chrysemys concinna	W
*Red-eared turtle	Chrysemys scripta	W
Chicken turtle	Deirochelys reticularia	W
*Eastern box turtle	Terrapene carolina	F
Ornate box turtle	Terrapene ornata	G
Smooth softshell	Trionyx muticus	W
Spiny softshell	Trionyx spiniferus	W
Alligator	Alligator mississippiensis	W
Green anole	Anolis carolinensis	W,B
Texas horned lizard	Phrynosoma cornutum	G
*Texas spiny lizard	Sceloporus olivaceus	W,B
Eastern fence lizard	Sceloporus undulatus	W,B

Table 14. Amphibians and reptiles which may occur on the Fayette Power Project Site. (cont.)

Common Name	Scientific Name	Habitat Preference[2]
*Five-lined skink	Eumeces fasciatus	F
Broad-headed skink	Eumeces laticeps	F
Prairie skink	Eumeces septentrionalis	G,B
*Ground skink	Leiolopisma laterale	F
Spotted whiptail	Cnemidophorus gularis	G
*Six-lined racerunner	Cnemidophorus sexlineatus	G,W
Slender glass lizard	Ophisaurus attenuatus	G
Texas blind snake	Leptotyphlops dulcis	G
Glossy snake	Arizona elegans	
*Racer	Coluber constrictor	G,B
Ringneck snake	Diadophis punctatus	F,W
Corn snake	Elaple guttata	F
*Common rat snake	Elaple obsoleta	F
Mud snake	Farancia abacura	W
Western hognose snake	Heterodon nasicus	G
Eastern hognose snake	Heterodon platyrhinos	G,F
Prairie kingsnake	Lampropeltis calligaster	G
Common kingsnake	Lampropeltis getulus	F,G
Milk snake	Lampropeltis triangulum	F
Coachwhip	Masticophis flagellum	G,B
Green water snake	Natrix cyclopion	W
*Plain-bellied water snake	Natrix erythrogaster	W
*Broad-banded water snake	Natrix fasciata	W
Graham's water snake	Natrix grahami	W
Diamond-backed water snake	Natrix rhombifera	W
*Rough green snake	Opheodrys aestivus	W
*Bullsnake	Pituophis melanoleucus	G
Mountain patch-nosed snake	Salvadora grahamiae	G,B
Brown snake	Storeria dekayi	W,F
Flat-headed snake	Tantilla gracilis	G,F
Checkered garter snake	Thamnophis marcianus	G,W
*Western ribbon snake	Thamnophis proximus	W
Common garter snake	Thamnophis sirtalis	W,G,F
Lined snake	Tropidoclonion lineatum	G
Rough earth snake	Virginia striatula	F
Smooth earth snake	Virginia valeriae	F
Coral snake	Micrurus fulvius	F
Copperhead	Agkistrodon contortrix	F
Cottonmouth	Agkistrodon piscivorus	W

Table 14. Amphibians and reptiles which may occur on the Fayette Power Project Site. (cont.)

Common Name	Scientific Name	Habitat Preference[2]
Massasauga	Sistrurus catenatus	G
Western diamondback rattlesnake	Crotalus atrox	G,B
Canebake rattlesnake	Crotalus horridus	F

1 Nomenclature and taxonomic order follow Conant (1975) and Raun and Gehlbach (1972).

2
B - edges, brush
F - forests
G - grasslands
W - streams, ponds

* Observed on site

Table 15. Birds which may breed on the Fayette Power Project Site.

Common Name	Scientific Name	Habitat Preference[2]
Eared grebe	Podiceps nigricollis	W
Least grebe	Podiceps dominicus	W
Pied-billed grebe	Podilymbus podiceps	W
Anhinga	Anhinga anhinga	W
*Green blue heron	Ardea herodias	W
*Green heron	Butorides virescens	W,F
Little blue heron	Florida coerulea	W,F
Cattle egret	Bubulcus ibis	G,W
Common egret	Casmerodius alba	W
Snowy egret	Egretta thula	W
Louisiana heron	Hydranassa tricolor	W
Black-crowned night heron	Nycticorax nycticorax	W,F
Yellow-crowned night heron	Nyctanassa violacea	W,F
Least bittern	Ixobrychus exilis	W
Black bellied tree duck	Dendrocygna autumnalis	W,F
Fulvous tree duck	Dendrocygna bicolor	W
Mallard	Anas platyrhyncha	W
Mottled duck	Anas fulvigula	W
Blue-winged teal	Anas discors	W
Wood duck	Aix sponsa	W,F
Ruddy duck	Oxyura jamaicensis	W
*Turkey vulture	Cathartes aura	all
*Black vulture	Coragyps atratus	all
White-tailed kite	Elanus leucurus	G
Mississippi kite	Ictinia misisippiensis	F,G
Cooper's hawk	Accipiter cooperii	F,B
*Red-tailed hawk	Buteo jamaicensis	all
Red-shouldered hawk	Buteo lineatus	F
Swainson's hawk	Buteo swainsoni	G,B
White-tailed hawk	Buteo albicaudatus	G,B
Harris hawk	Parabuteo unicinctus	B
Bald eagle	Haliaeetus leucocephalus	W,F
Marsh hawk	Circus cyaneus	G
*Caracara	Caracara cheriway	G,B
*Bobwhite	Colinus virginianus	G,B
Turkey	Meleagris gallopavo	F,B
King rail	Rallus elegans	W
Purple gallinule	Porphyrula martinica	W
Common gallinule	Gallinula chloropus	W

Table 15. Birds which may breed on the Fayette Power Project Site. (cont.)

Common Name	Scientific Name	Habitat Preference[2]
American coot	Fulica americana	W
*Killdeer	Charadrius vociferus	G,W
*Rock dove	Columba livia	H
*Mourning dove	Zenaida macroura	all
Ground dove	Columbina passerina	B,H,F
*Inca dove	Scardafella inca	H,G
*Yellow-billed cuckoo	Coccyzus americanus	G,B
*Roadrunner	Geococcyx californianus	G,B
Barn owl	Tyto alba	F,G,H
Screech owl	Otus asio	F
Great horned owl	Bubo virginianus	F
Burrowing owl	Speotyto cunicularia	G
*Barred owl	Strix varia	F
*Chuck-will's-widow	Caprimulgus carolinensis	F
*Common nighthawk	Chordeiles minor	G,H
*Chimney swift	Chaetura pelagica	H
Ruby-throated hummingbird	Archilochus colubris	flowering plants
*Belted kingfisher	Megaceryle alcyon	W
*Common flicker	Colaptes auratus	F,H
Pileated woodpecker	Dryocopus pileatus	F
*Red-bellied woodpecker	Centurus carolinus	F,H
Red-headed woodpecker	Melanerpes erythrocephalus	G,F,H
Hairy woodpecker	Dendrocopus villosus	F
*Downy woodpecker	Dendrocopus pubescens	F
Eastern kingbird	Tyrannus tryannus	G
Western kingbird	Tyrannus verticalis	G
*Scissor-tailed flycatcher	Muscivora forficata	G,B
Great crested flycatcher	Myiarchus crinitus	F
Eastern phoebe	Sayornis phoebe	G,H,B
Eastern wood peewee	Contopus virens	F
Horned lark	Eremophila alpestris	G
Rough-winged swallow	Stelgidopteryx ruficollis	W
*Barn swallow	Hirundo rustica	G,W
Cliff swallow	Petrochelidon pyrrhonota	G,W
*Purple martin	Progne subis	G,H
*Blue jay	Cyanocitta cristata	F,H
*Common crow	Corvus brachyrhynchos	F,G
*Carolina chickadee	Parus carolinensis	F,H
*Tufted titmouse	Parus bicolor	F,H
Bewick's wren	Thryomanes bewickii	B,H
*Carolina wren	Thryothorus ludovicianus	F,B,H
*Mockingbird	Minus polyglottus	G,B,H

Table 15. Birds which may breed on the Fayette Power Project Site. (cont.)

Common Name	Scientific Name	Habitat Preference[2]
Catbird	Dumetella carolinensis	B
Brown thrasher	Toxostoma rufum	B
Robin	Turdus migratorius	G,B,H
Wood thrush	Hylocichla mustelina	F,B
Eastern bluebird	Sialia sialis	G
Blue-gray gnatcatcher	Polioptila caerulea	F,B
*Loggerhead shrike	Lanius ludovicianus	G
Starling	Sturnus vulgaris	G,H
*White-eyed vireo	Vireo griseus	B
Bell's vireo	Vireo belli	F,B
Yellow-throated vireo	Vireo flavifrons	F
Red-eyed vireo	Vireo olivaceus	F
Black-and-white warbler	Mniotilta varia	F,B
Prothonotary warbler	Protonotaria citrea	F,W
Parula warbler	Parula americana	F
Yellow-throated warbler	Dendroica dominica	F
Pine warbler	Dendroica pinus	pines
Kenturky warbler	Oporornis formosus	F
*Yellowthroat	Geothlypis trichas	F,B
*Yellow-breasted chat	Icteria virens	B,F
*House sparrow	Passer domesticus	H
*Eastern meadowlark	Sturnella magna	G
*Red-winged blackbird	Agelaius pheoniceus	W,G
*Orchard oriole	Icterus spurius	B,H
Northern oriole	Icterus galbula	G,H
*Great-tailed grackle	Cassidix mexicanus	W,B,H
Common grackle	Quiscalus quiscala	G,H,W
*Brown-headed cowbird	Molothrus ater	G,B,F
Bronzed cowbird	Tangavius aeneus	G,B
*Summer tanager	Piranga rubra	F,H
*Cardinal	Cardinalis cardinalis	B,F,H
Blue grosbeak	Guiraca caerula	B
Indigo bunting	Passerina cyanea	B
*Painted bunting	Passerina ciris	F,B
Dickcissel	Spiza americana	G
Grasshopper sparrow	Ammodramus savannarum	G
*Lark sparrow	Chondestes grammacus	G,B

1 Nomenclature and taxonomic order follow Peterson (1963) and the 32nd Supplement to the A.O.U. Checklist (1973)

2
B - brush, edges
F - forests
G - grasslands, open farmland
H - streams, ponds, marshes
- permanent resident

* Observed on site

Table 16. Results of early morning cock-call count on the Fayette Power Project Site.

Species	Maximum No. Heard/day	Average No. Heard/day	Maximum No. Seen/day	Average No. Seen/day
Bobwhite	38	29	9	6
Mourning dove	21	19	19	13

Table 17. Mammals which may occur on the Fayette Power Project Site.

Common Name	Scientific Name	Habitat Preference[2]
*Opossum	Didelphis marsupialis	F,G
Eastern mole	Scalopus aquaticus	sandy soils
Little short-tailed shrew	Cryptotis parva	G
Georgia bat	Pipistrellus subflavus	W,H
Red bat	Lasiurus borealis	F
Yellow bat	Lasiurus intermedius	
Evening bat	Nycticeius humeralis	F,W
Guano bat	Tadarida mexicana	H
*Raccoon	Procyon lotor	F,W
Ringtail	Bassariscus astutus	F
Long-tailed weasel	Mustela frenata	G,F
Mink	Mustela vison	W,F
Spotted skunk	Spilogale putorius	F,G
*Striped skunk	Mephitis mephitis	F,G,B
Hog-nosed skunk	Conepatus mesoleucus	F,B
*Gray fox	Urocyon cinereoargenteus	F
Coyote	Canis latrans	G,B
Cougar	Felis concolor	F
*Bobcat	Lynx rufus	F,B
Thirteen-lined ground squirrel	Spermophilus tridecemlineatus	G
Gray squirrel	Sciurus carolinensis	F,W
*Fox squirrel	Sciurus niger	F
Eastern flying squirrel	Glaucomys volans	F
*Plains pocket gopher	Geomys bursarius	sandy soils
Hispid pocket mouse	Perognathus hispidus	G
Beaver	Castor canadensis	W
Long-tailed harvest mouse	Reithrodontomys fulvescens	G
Gray harvest mouse	Reithrodontomys montanus	G
Pygmy mouse	Baiomys taylori	G
Deer mouse	Peromyscus maniculatus	G,B
*White-footed mouse	Peromyscus leucopus	F
Hispid cotton rat	Sigmodon hispidus	G
*Florida wood rat	Neotoma floridana	F
House mouse	Mus musculus	H
Roof rat	Rattus rattus	H
Norway rat	Rattus norvegicus	H
Nutria	Myocaster coypus	W
*California jack rabbit	Lepus californicus	G

Table 17. Mammals which may occur on the Fayette Power Project Site. (cont.)

Common Name	Scientific Name	Habitat Preference[2]	
*Eastern cottontail	Sylvilagus floridanus	B	*
Swamp rabbit	Sylvilagus aquaticus	F,W	
*White-tailed deer	Odocoileus virginianus	F,B	*
*Nine-banded armadillo	Dasypus novemcinctus	all	

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1 Nomenclature and taxonomic order follow Davis (1966) and Jones et al (1973).

2
- B - brush, edges
- F - forests
- G - grasslands
- H - human habitations
- W - streams, ponds

* Observed on site

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Table 18. Results of small-mammal trapping on the Fayette Power Project Site.

Trapping Site	1	2	3	4	5	6	7	8	
Habitat	Oak-Cedar Forest	Improved Pasture	Pasture-Woodland Edge	Live-Oak Forest	Overgrazed Pasture	Live-Oak Forest	Native Pasture	Oak Forest	TOTAL
Trap Nights	192	144	144	72	48	144	144	96	984
Species									
Nectoma floridana	---	---	1	3	---	---	---	---	4
Permoyscus leucopus	2	---	1	---	---	---	---	---	3
Trap Nights/Catch	96	---	72	24	---	---	---	---	141

Table 19. Numbers and relative abundances of tracks of large mammals recorded on 4.0 km of track transects on the Fayette Power Project Site.

Species	Grassland	Savannah	Forest	Total
Armadillo	11(42%)	15(47)	22(29)	48(36)
Deer	13(50)	12(38)	20(26)	45(33)
Raccoon	2(8)	1(4)	27(35)	30(22)
Squirrel	---	2(6)	2(3)	4(3)
Cottontail	---	1(3)	2(3)	3(2)
Fox	---	---	2(3)	2(1)
Opossum	---	---	1(1)	1(1)
Skunk	---	1(3)	---	1(1)
Bobcat	---	---	1(1)	1(1)
	26(100)	32(100)	77(101)	135(100)